

**COLONY & PROTECTORATE
OF KENYA.**



ANNUAL REPORT
OF THE
DEPARTMENT of AGRICULTURE
FOR THE
YEAR ENDED 31ST DECEMBER,
1925.

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INDEX.

—: o :—

	A	PAGE.
Acreage & Occupation	...	10
Agricultural Census	...	7
Agricultural Supervisor, Scott Laboratory	...	169
Analysis of Dip Samples	...	126
Anaplasmosis	...	67
Anthrax	...	64
Avian Diseases	...	123
	B	
Bacon & Ham	...	8, 9, 31
Barley	...	14
Blackquarter	...	64
Brands Ordinance	...	65
British Empire Exhibition	...	36
Buckwheat	...	23, 198
	C	
Canine Diseases	...	65
Castor	...	18
Cattle, purebred importations	...	31
Chemist, Agricultural, Report	...	125
Chief Veterinary Officer Report	...	43-67
Chief Veterinary Research Officer—Report	...	68
Coconuts	...	17, 19, 185, 187
Coffee	...	177
Coffee, acreage	...	15
Coffee, Exports	...	15
Coffee, pests and Diseases	...	15, 137-140, 142, 146, 147, 148, 151, 155-157
Coffee, prices	...	4, 159
Cotton	...	21, 22, 184, 192, 195, 197
Crops, Diseases. (See also under Coffee, Maize, etc.)	...	145-148
Crops, Native	...	21, 145, 171, 194, 197, 199, 200
Crop Production & Livestock Ordinance	...	19, 27
Crop Reports	...	7
	D	
Dairying, Officer	...	29
Dairy Products	...	28, 32, 171
Dips and Dipping	...	62, 126, 129, 145
Director, Report of	...	1-39

INDEX—contd.

PAGE.

E

East African Stud Book	...	...	37
East Coast Fever	...	...	47, 60-62, 83
Economic Surveys	...	...	34
Education, Native	...	...	25, 51
Entomologist, Report	...	...	133
Entomology	...	...	2, 135
Equines	...	...	65
Exports	...	...	9, 24, 33, 34, 165 167, 190
Exports, Native	...	...	203

F

Financial, General	...	...	3, 4
Financial, Veterinary	...	...	3
Financial, Veterinary Research	...	...	3
Flax, acreage	...	...	17, 160
Flax, Experiments	...	...	181
Flax, grading	...	...	17, 161, 167
Flax Officer - Report	...	...	160

G

Gallsickness	...	...	67, 82
Ghee	...	...	28, 171, 186, 199
Grader and Inspector...	...	...	164-167
Green manures	...	...	130, 176
Groundnuts	...	...	21, 23, 147, 194, 196, 198

H

Hides & Skins	...	...	27, 47, 60, 185
Horticulture	...	...	19
Horsesickness	...	...	66

I

Implements	...	...	22, 197
Imports, Agricultural	...	...	7, 9, 34
Indian Agriculture	...	...	19
Inoculations, Rinderpest	...	...	45, 55-56

L

Laboratory diagnoses	...	...	71 et seq.
Laboratory products	...	...	70, 74-75
Labour	...	...	35
Labour Statistics	...	...	35
Land Settlement	...	...	35
Library and Publications	...	...	37
Linseed	...	...	172, 176
Livestock, Diseases	...	...	48

INDEX—contd.

	L--concl'd.	PAGE.
Livestock, Europeans...	...	... 30
Livestock, Importations	...	... 31, 46, 47, 67
Livestock, Native	...	... 26, 171, 185, 202
Lymphangitis	...	... 65-66
M		
Main crops	...	... 10
Maize	...	... 11-12, 19, 21, 22, 144, 151-152, 162, 165-166, 171-175, 180, 184, 194
Maize Conference	...	... 12
Maize Grading, and Conditioning	...	... 2, 12, 34, 165-166, 167
Maize, Native	...	... 22, 194, 196
Maize Pests and Diseases	...	... 144, 146-147
Manures	...	... 127, 129, 130-132, 143
Market prices	...	... 4, 184-185
Mealy bug	...	... 128, 137
Meat prices	...	... 32
Meteorological	...	... 6, 20-21, 182-183, 192, 199, 205
Mortality in Calves	...	... 67, 106-110
Mosaic Disease, Sugar	...	... 18, 143, 146, 147
Mycologist, Report	...	... 141
N		
Naivasha Government Farm	...	... 32
Native Agriculture	...	... 19, 24, 173
Native Agriculture, Staff	...	... 173, 182
Native Education	...	... 25, 170, 174, 186, 201-202
Native Reserves	...	... 4-7, 19-22
O		
Occupation and acreage	...	... 7
Ordinance - Crop Production & Livestock	...	... 19-27
P		
Parasitic Worms	...	... 111
Pigs	...	... 33
Piroplasmosis	...	... 67
Plant breeding	...	... 33, 149
Plants and seeds imports	...	... 142, 164, 178-179
Pleuro-pneumonia	...	... 63
Pleuro-pneumonia, vaccine	...	... 63
Poultry, Diseases	...	... 64, 123-124
Publications & Library	...	... 37, 134, 146, 153

INDEX—contd.

PAGE.

R

Redwater	...	...	... 67, 82
Revenue	...	...	... 3, 34, 46, 70, 161
Rice	...	...	... 24, 194
Rinderpest	...	...	... 45, 48-50, 76-82
Rust in Wheat	...	...	... 162

S

Seed Farms	...	...	... 21
Seed Imports	...	...	... 177
Seed Issues	...	...	... 21, 172, 184, 189
Senior Coffee Officer, Report	...	...	... 153, 177
Senior Agricultural Supervisor Coast-Report...	...	...	... 182
Senior Agricultural Supervisor Nyanza-Report	...	...	... 192
Sericulture	...	...	... 134, 177
Sheep, Imports	...	...	... 33
Sheep, Diseases	...	...	... 60, 110-111
Shows, Agricultural	...	...	... 36, 125, 145
Shows, Agricultural, Native	...	...	... 26, 187
Simsim	...	...	... 21, 23, 194, 196, 198
Sisal, acreage	...	...	... 16
Sisal, blackening of leaves	...	...	... 145
Sisal, grading	...	...	... 16
Sisal, exports	...	...	... 16
Slaughter Stock	...	...	... 47, 59
Spirillosis	...	...	... 84
Staff	...	...	... 1, 20, 40-41, 125, 133, 141, 153, 164, 182, 192, 199
Staff changes	...	...	... 43, 68, 169
Staff List	...	...	... 41-42
Staff Services	...	...	... 2
Statistics, Agricultural	...	...	... 7, 153
Sterility in Cattle	...	...	... 105
Stud Book	...	...	... 37
Sugar, acreage	...	...	... 17
Sugar, disease	...	...	... 18, 143, 146, 147
Sugar, production	...	...	... 17, 19
Sunflower	...	...	... 18, 175
Survey, Economic	...	...	... 34
Swine Fever	...	...	... 111

T

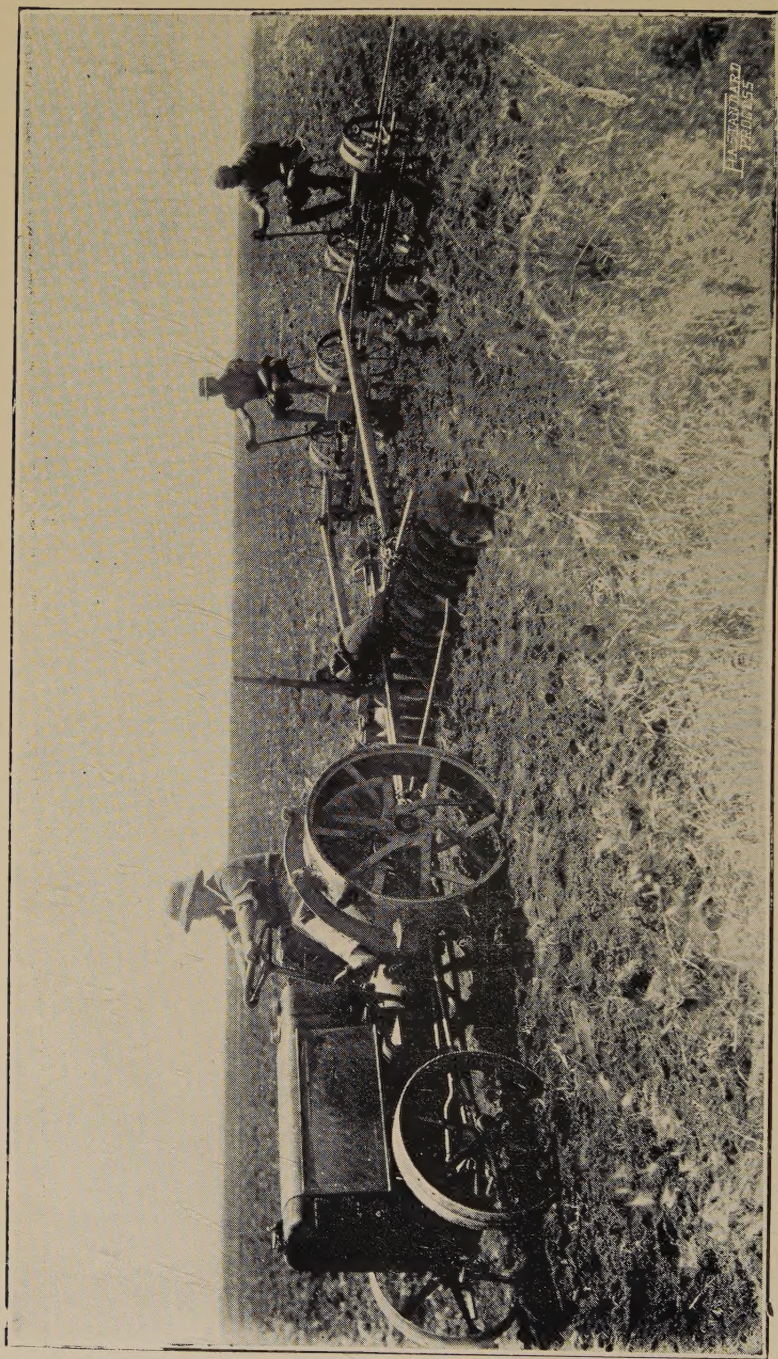
Tea	...	...	... 18, 146
Trypanosomiasis	...	...	... 50, 51, 199
Tuberculosis	...	...	... 60

INDEX—concl'd.

	PAGE.
V	
Vaccine, Pleuro-pneumonia ...	63
Vaccine Producers, Redwater Gallsickness ...	83
Value of Agricultural Exports ...	9
Veterinary Department ...	43, 68
Veterinary Stations in Reserves ...	51-56
Veterinary Training School ...	54
W	
Wattle ...	18
Wheat ...	13-14, 24, 149-151
Wheat breeding ...	33-34, 149-152
Wheat, native ...	171, 198
Wheat, prices ...	13-14
Wheat, protective duty ...	14
Wheat, rust ...	148, 162
Wireworm ...	127

ILLUSTRATIONS.

Modern Methods of Maize Planting ...	1
A Maize Field of 1,200 Acres at Kedong ..	11
Sisal Estate Near Thika ...	16
A Herd of "Native" Cattle ...	26
Friesland Cattle at Limuru ...	31
Sugar Cane (Uba) at Miwani ...	39
A Flock of Grade Merino Sheep ...	43
Veterinary Research Laboratory, Kabete. (Main Building) ...	68
Veterinary Research Laboratory, Kabete. (Stock Sheds and Paddocks) ...	80
Scott Agricultural Laboratories ...	125
Coffee in Bearing near Nairobi ...	153



Modern Methods of Maize Planting.

COLONY AND PROTECTORATE OF KENYA.

ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR THE

YEAR ENDED 31ST DECEMBER, 1925.

REPORT OF DIRECTOR.

STAFF, &c.

The difficulty of providing the many services ; which should be rendered by a Department of Agriculture, efficiently staffed to carry out its functions, is being acutely felt at this stage of the development of the Colony, when the demands upon Government for many new and apparently essential services are pressed. Only those closely associated with the day-to-day administration and activities of the Department of Agriculture, serving a country so young in its stage of development and about which so little is known, can fully realise how inadequate is the information and knowledge possessed of its resources, the lines along which development should proceed, and the best methods to be adopted.

The need and the importance of well organised Departments of Agriculture in the Crown Colonies was forcibly expressed in the report of a Committee appointed to advise the Secretary of State, which said : " In the course of our enquiries we have been profoundly impressed by the magnitude and importance of the tasks which the Colonial Agricultural Departments have to perform." Again, " But, though our proposals deal only with existing conditions, we should fail in our duty, if, in framing them, we did not bear in mind the enormous development which is certain to occur both in the responsibilities of the Colonial Agricultural Departments and in the scope of the benefits, which they will, if properly equipped, be able to confer on their particular Dependencies, and on the Empire at large."

It may be said that as compared with other countries the services to be rendered here are applicable to a comparatively small number of people engaged in agricultural pursuits, but it should be noted that agriculture in Kenya is not confined to one or two major products. It is very diverse in character, the problems to be dealt with are numerous, Native as well as European interests require attention, and ever there is the proper desire on the part of a highly intelligent farming community to be in the vanguard of progress and method. The position is that the activities of the Department of Agriculture in Kenya are not governed by the extent of the service, but by the large number of services which have to be rendered and subjects which have to be dealt with.

The only increases in new appointments during the year consist of one Entomologist, one Foremen Mechanic for the Maize Conditioning Plant, and four Stock Inspectors.

The volume of work passing through Head Office continues to increase steadily and at times it has been difficult to discharge it with that promptitude which is the Department's aim.

Advisory services continue to be rendered by many Officers of the Department, and the sectional Reports—attached hereto—show that a great deal of useful research and experimental work has been carried out, having regard to the staff and facilities available. There has been an extension of experimental work in co-operation with farmers, and unsatisfactory though that method is in some important respects, there is no alternative in the absence of Experiment Stations under Departmental control.

Lectures and addresses have been delivered at Farmers' meetings by the Director and Staff, generally under the auspices of local Associations. This form of extensive service is useful to the farming community and keeps the Department in touch with the problems of agricultural practice. It was proposed to resume the Short Courses of Instruction in Agriculture and Agricultural Science which proved so successful in 1920-21 and arrangements were made accordingly, but Staff shortage and pressure of work necessitated their postponement.

Veterinary services are progressing along sound lines. Features of the year were the institution of a Special Rinderpest Service and the response of native stock-owners to facilities offered for inoculation against Rinderpest and Pleuro-pneumonia.

FINANCIAL :

Statements of Revenue and Expenditure for the Fiscal Year under review are given hereunder :—

EXPENDITURE.

	Amount originally sanctioned.	Amount spent.
	£	£
Administrative and General ...	16,839	17,139
Native Agriculture ...	11,953	11,013
Scott Agricultural Laboratories ...	6,180	5,913
Grading and Conditioning Export Produce ...	1,722	1,855
Contributions to Imperial Bureaux of Entomology and Mycology ...	400	450

VETERINARY.

(a) Administrative and Executive Division ...	21,568	24,019
(b) Native Reserves ...	10,110	9,842
(c) Rinderpest Service ...	...	2,486
(d) Research Division ...	22,918	27,734
(e) Division of Veterinary Adviser ...	749	695
Total Agricultural Department :—	£ 92,439	£ 101,146

REVENUE.

	Original Estimate.	Amount collected.
	£	£
Agricultural Produce, Grading and Inspection Fees ...	2,000	2,422
Farm Produce and Stock ...	125	115
Testing, Dipping Fees &c. ...	10,000	24,520
Sera, Vaccines and Laboratory Products.	7,000	6,543
Sale of Government property-Stores ...	200	450
	£ 19,225	£ 34,050

The amount expended under each Sub-Head approximated the sanction very closely. Increases in expenditure were due almost entirely to an extension of Veterinary Services, but the increased Revenue derived therefrom more than covered the Expenditure.

The excess expenditure amounted to £8,767 while the revenue obtained was £14,725 above the estimate.

The nett cost to the Colony's Exchequer of Agricultural Services (including Veterinary) rendered Departmentally, was only £67,090, to which may be added a capital expenditure of about £2,250 incurred through the Public Works Department—also the cost of Medical Services and Housing, roughly estimated at £9,500.

GENERAL :

The Agricultural Year 1925 was very variable, and but moderate in regard to yield of crops. The total rainfall was generally up to the average, but its incidence for purposes of crop production was unsatisfactory, and throughout extensive areas crops suffered not infrequently from drought, particularly those planted late in the season. In the Trans Nzoia and Uasin Gishu conditions were very favourable and good yields were obtained. In some of the Coffee Districts, notably Thika, Ruiru and Kyambu, growth in the plantations was temporarily set back, yields were reduced and quality suffered on account of inadequacy of rainfall at critical periods.

In the Native Reserves fears were entertained for a time in regard to food supplies, but excepting in the Kerio Province and in part of the hinterland of the Coast no serious shortage took place. With the increase in development generally (particularly European) throughout the Colony and the varied climatic conditions the possibility of circumstances arising whereby it would become necessary to import food supplies, as had to be done in 1918, is remote.

Market prices of some agricultural exports fell considerably towards the latter half of 1925, notably in the case of Maize, Coffee, Oil seeds, and Cotton. In my last report lower market values oversea were forecasted and the need for reducing costs of production through the exercise of economy, sane judgment and good management is again urged. There is evidence to show that economies are being effected in the use of labour, and with more experience better farming methods are pursued, wasteful expenditure is being avoided, and reductions in costs are being effected without loss of efficiency.

The margin between cost of production and prices realised is great enough to yield a profitable return on farming pursuits generally in this Colony and in some cases it is considerable, notably in that of Sisal, Coffee and Maize. At the same time owners of land see their property steadily enhancing in value. In the absence of those favourable conditions the farming community could not bear the comparatively high interest charges required by Banks and Mortgagees.

A good deal of uncertainty attended by a sense of insecurity obtains, and development and progress are somewhat restricted through the insufficiency of labour. While it would probably be admitted that the farming industry can afford to pay higher rates of wages, particularly if accompanied by that greater efficiency which would be acquired by labourers employed more constantly and for longer periods, yet it is unfortunately true in the peculiar circumstances that higher wages do not necessarily increase the supply of labour. The view may here be expressed that not until there is permanently resident in the alienated areas a large number of native labourers with their families, free to engage their services by their own volition, will the labour needs of European holdings be satisfactorily met.

Efforts are being made to reduce the number of units of labour required on holdings by the introduction of labour saving machinery and implements and by the adoption of improved methods of culture. The year has been noteworthy for the increasing interest taken in the use of agricultural tractors for ploughing and other operations. The high cost of draught oxen, the inefficiency of labour in their use, and the higher value of land, have all contributed towards a change from the ox to the tractor. Despite higher costs of the actual operation the farmer may, in particular where a larger proportion of the holding can thereby be cultivated, find the system economically sound. Again tractors should prove serviceable in raising the level of production, as owing to their use extensive farming operations can be more efficiently controlled and large areas of crops on individual holdings can be sown or planted at the proper season. With improvements likely to be effected in the tractors themselves and with reductions in the cost of fuel oils, it is likely that benefits will accrue from the use of tractors, especially on large holdings where they supplement draught oxen.

The rising cost of farm produce consumed locally has given rise to criticism and complaints on the part of the public. Apart from the temporary shortage due to drought in pastoral areas, the position broadly is that the local market is so small that its requirements are easily met and there is a latent fear that it may readily be oversupplied with the result that prices would then quickly fall. Again, the tendency at the present stage of development of agriculture in this Colony is for production to be specialised along one particular line on comparatively large holdings. An increase in the supply of perishable products *e.g.* milk, butter, cheese, fruit, vegetables, bacon and hams, &c., will come with that development of mixed farming which is indicated in several districts. The increase in population and the prosperity of the community have made the demands greater with the result that prices have risen. These increased demands have not been confined to

Kenya, for to other parts of East Africa supplies of this kind are made. Enquiry shows, however, that these higher prices have not been due to the protection afforded to local products through Customs and Railway freight, and it should be noted that world prices of products of the kind mentioned have been much higher in recent years. It is important, however, that the country should be self-supporting and that consumers should be supplied at reasonable prices. The surest way to achieve that is concurrently to develop an outside market for the surplus and to provide the necessary facilities for marketing these perishable products oversea.

The decision of Government to provide Cold Storage facilities at the Port, a service which is now in process of being established, is an important step in that direction.

METEOROLOGICAL.

Again the financial provision allows of nothing more than the upkeep of existing stations. The number of stations whose records were tabulated in the Meteorological Report, which is published annually, was 209, an increase of two. They are comprised as follows:—

	No. of Stations.
(a) Agricultural, Forestal, and Public Works	18
(b) District and Military	38
(c) Railway	19
(d) Private	134
Total	209

A summary of the Meteorological records for 1925 is appended.

In order to ensure that records are being properly taken, that sites of recording stations are well chosen and that observation and records are made along standardised lines it is very necessary that stations should be periodically inspected. More inspection than is at present possible is required to secure a fully efficient service.

AGRICULTURAL STATISTICS.

The 6th. Agricultural Census for the period 1924—25 was taken. The Report embraced the first complete Agricultural Census taken since 1922, which is in accordance with the decision to take the complete Census triennially, and in intervening years to confine the Annual Census to :—

- (a) Land under occupation and cultivation.
- (b) Main crops.
- (c) Animal husbandry.
- (d) Agricultural Exports.

It is proposed to introduce shortly a system of Crop Reports, both for European areas and Native Reserves, whereby forecasts of production in the succeeding season can be made. That information should prove useful to the Railway Department and Shipping Companies, also to Government in reference to the economic position generally, and as to food supplies in native areas.

Imports.—The following table showing the quantities of foodstuffs imported in 1914 and the post war years, is of interest. They are for Kenya and Uganda. Separate figures are not available for Kenya.

IMPORTS—KENYA AND UGANDA.

	QUANTITY.								VALUE &							
	1925.	1924.	1923.	1922.	1921.	1920.	1919.	1914.	1925.	1924.	1923.	1922.	1921.	1920.	1919.	1914.
Wheat ... Cwts.	2,685	1,993	1,983	900	1,352	337	681	5,585	2,524	1,623	1,590	879	1,900	515	845	3,091
Wheat Meal & Flour "	53,557	48,474	47,599	59,817	78,069	76,823	83,171	81,898	36,364	40,792	40,362	63,775	102,025	112,795	94,989	52,890
Ham & Bacon ... "	58	23	5	9	20	118	23	701	641	217	73	117	285	1,368	205	4,256
Butter ... Lbs.	2,688	1,120	560	4,032	11,981	3,890	43,820	34,997	283	122	74	412	1,383	515	4,213	1,972
Cheese ... "	3,854	3,248	1,456	1,792	2,561	12,636	4,449	38,836	401	292	180	201	354	922	167	1,820
Ghee ... Cwts.	7,309	8,592	5,253	4,209	1,878	600	3,075	2,347	42,685	28,740	13,717	14,631	13,900	5,310	8,202	8,702
Condensed Milk "	6,258	5,352	3,105	1,305	4,560	5,210	5,308	9,468	22,990	20,851	11,912	5,247	25,076	22,554	23,032	20,498
Sugar ... "	27,161	27,446	31,632	69,212	65,958	47,921	71,651	74,485	31,475	42,904	54,041	89,405	129,869	167,554	126,849	54,829

The total value of these imports, representing articles of food which might be produced locally, amounts to £157,363, an increase of £21,822 over last year.

The figures in respect of ham and bacon, butter and cheese, are insignificant and probably concern special imports for "safari" purposes. Elsewhere an increase in wheat production is shown, but it has not been sufficient to meet the larger demands of Kenya and Uganda in respect of Wheat flour, of which there was an increase in importation of 5,083 cwts. Ghee imports show a reduction of 15 per cent. That, coupled with a large increase in consumption reflects progress in the Ghee Industry.

The development of the Dairying Industry is not yet sufficiently advanced to contemplate the manufacture locally of Condensed Milk.

The figures of imports of Sugar are also disappointing, inasmuch as well equipped Mills—two of them of fair capacity—have been established in Uganda and Kenya. It is expected that, when difficulties connected with factory operations are removed, and the crops of cane are sufficient, the Sugar supplies will meet at least the needs of East Africa.

EXPORTS.

The total value of agricultural exports, the produce of Kenya, in 1925 was £2,296,698, an increase of £146,922 on the previous year. The tonnage was 98,912 tons in 1925 against 98,094 tons in 1924, apart from the living animals shipped. The schedule, Appendix "P," furnishes an interesting comparison of the quantity and value of agricultural exports in each year from 1919 to 1925 inclusive, also for 1914.

It will be seen that the rapid rate of progress from 1922 to 1924 has been arrested somewhat in 1925. That is partly to be accounted for by the unfavourable season, but there is also reason to believe that the inadequacy of labour has been an important factor. With a reduction of the units of labour of nearly 10 per cent. it is surprising that production has been increased.

The transfer of the Port of Kisumu to Italy accounts for the reduction in export of living animals.

The reductions in the export of Butter and Cheese are in accord with the increased local demand and that of Copra is to be accounted for by the establishment of a Soap Factory at Mombasa.

The lower yields of crops is reflected in the short fall under Coffee, Ground nuts, Pulse and Simsim. Pulse is also being used locally in increasing quantities for the rationing of natives.

A slight increase in Maize is shown but the poorer crop of 1925 will be reflected chiefly in the 1926 returns.

The increase in Sisal from 11,415 tons in 1924 to 14,363 tons in 1925 is evidence of the stability of this industry which is little affected by seasonal conditions.

Cotton exports show an increase of 375 per cent.

Increases in the export of Hides and Skins continue at a steady rate.

Based upon export values the order of importance of the various industries is (1) Coffee ; (2) Sisal ; (3) Maize ; (4) Hides & Skins ; (5) Simsim ; (6) Wool.

It should, however, be noted that in the case of Maize it is estimated that there is marketed locally—apart from that consumed in the reserves—a quantity approximately equal in value to that exported. That places maize in the first position in point of production.

ACREAGE & OCCUPATION.

The total area allotted for occupation by Europeans is approximately 5,000,000 acres, and in addition to this an acreage of about 2,000,000 acres is available for alienation. Of the area allotted 4,420,573 acres are in occupation showing an increase of 227,842 acres over the previous year. The number of occupiers totals 1,695. The total area cultivated is 322,628 acres giving an average of 232 acres per occupier, against 214,187,169 and 154 acres for the years 1924, 1923, 1922 and 1921 respectively. Including the development through livestock on a basis of six acres per head for cattle and three acres per head for small stock the average development by each European occupier is 1325 acres which shows the extensive character of farming operations in this Colony.

The figures for individual crops show that Maize, Coffee, Sisal, Wheat and Sugar Cane are increasing, with a decrease in Flax, whilst Barley remains stationary. Further particulars of crop production and livestock will be found under appropriate headings in this report.

MAIN CROPS.

On June 30th, 1925, the total area under crops—European—was 324,331 acres, and the total area under cultivation was 392,628 acres. For comparative purposes figures for the previous year are given and the percentages of increase and decrease are shown:—

Crop.			1925.	1924.	Increase.	Decrease.
			Acres.	Acres.	per cent.	per cent.
Maize	...	...	155,916	141,147	10	...
Wheat	...	...	21,085	20,910	8	...
Barley	...	...	950	725	31	...
Coffee	...	...	65,140	60,054	8	...
Sisal	...	...	52,872	45,323	17	...
Flax	...	...	552	2,133	...	74
Coconuts	...	...	8,971	8,924	5	...
Sugar Cane	...	...	6,556	5,243	25	...
Miscellaneous	...	...	18,102	19,320	...	6
Total acreage of crops grown			330,144	303,779	...	...
Less Catch Crops	...	...	5,813	6,442	...	...
Nett area under crops			324,331	297,337	9	...



A. Maize Field of 1200 Acres at Kedong

MAIZE.

After a successful year experienced in 1924, it is not surprising that much interest was shown in the Maize crop, and though the season's figures reveal an increase of only 10 per cent in the area planted as at 30th June (155,916 acres) it is known that many thousands of acres were planted after that date, but unfortunately the crop therefrom did not add a great deal to the production on account of the unfavourable season. Yields of Maize in various districts are of a high average, ranging from 5 to 9 bags per acre, with an average of about 7 bags per acre. There are records of over 20 bags per acre from comparatively large acreages on individual farms. The following table showing acreages and yields of maize in past years is of interest :—

Year		Acreage harvested.	Actual Production.	Bags.
		Acres.	Bags.	Per acre.
1922—1923	...	74,747	517,877	6.23
1923—1924	...	108,556	833,640	7.68
1924—1925	...	129,647	893,108	6.89

Attention has been given to the selection of maize in the field on various farms in the Nakuru District and the varying conditions found in different localities are also studied. It is hoped that, by continuous field selection and elimination, strains of uniform type possessing higher yielding power will be established. Though no Officers are specifically assigned to this work the services of some members of the staff have been utilised to bring this method to the attention of maize growers, and already good results have been obtained.

The need for maintaining soil fertility on farms continuously cropped with maize is now being realised by owners. Steps have been taken to study soil conditions and to assist farmers in laying down experimental plots with the object of determining the best system of manuring and cropping to be adopted.

The value of deeper cultivation is also indicated, particularly on lands which have been cropped for some years.

The Third Maize Conference was held at the Offices of this Department and the Report of its deliberations was duly published. Effect was given to the recommendations of the Conference which also received the support of the London Corn Trade Association. The chief of these were :—

(1) The reduction of moisture content permissible to 12·5 per cent.

(2) Prohibition of export of “weevily” maize, but “slightly weevily” to be permitted.

(3) Introduction of additional grade No. 3 for “Flat White.”

(4) Additional mark (C) to maize treated by heat for the destruction of weevils.

(5) Improvement in quality of bag.

(6) Authority to determine weight by weighing 10 per cent of bags.

The necessary alterations have been made to the Grading of Maize Rules.

During 1925—note, these figures should not be confused with those submitted to the Maize Conference for the year July-June—the total number of bags offered for grading was 619,919 or some 70,000 bags less than in the previous year, the principal falling off being in “Native” maize, but a larger quantity of maize of this type—in all about 100,000 bags—was exported to Ports south of Port Said and under the Maize Grading Rules that Maize was not subjected to inspection.

Of the graded maize 91,868 bags were rejected. They comprised (a) Wet, 48,004; (b) Musty, 15,945; (c) Weevily 24,391; and the balance of 3,528 for other causes. Therefore, approximately 15 per cent of the maize received was rejected for grade, but most of it was conditioned and ultimately exported. There was an increase in the proportion of wet maize, particularly during the first three months of the year.

The revenue derived from Maize Grading Fees was £1,875.

The Maize Conditioning Plant was put into operation on November 1st. It was specially designed to deal not only with excess moisture, but also with the destruction of insect life. It has a capacity of 5—6 tons per hour, and its cost, including storage sheds for receiving and grading the grain after treatment, is about £10,500. Its efficiency and suitability for the purpose for which it was designed has already been proved.

The maize industry is of such importance to the Colony, and the opportunities are so great of improving its position through seed selection and maintaining or increasing yields through the results of experimental work that, the appointment of an Officer, technically trained and skilled in maize growing, would be fully justified.

WHEAT.

The area planted at June, 30th, 1925 was 21,085 acres, an insignificant increase as compared with the previous year, but it is known that a considerable area was planted after that date for the 1925 crop. The rate of increase has not, however, been maintained.

The acreage harvested in each year and the production during the last few years are as following :—

Year.		Acreage harvested.	Actual production.
		Acres.	Bags.
1922—1923	...	15,158	35,793
1923—1924	...	19,599	55,920
1924—1925	...	23,996	61,067

The risk of "rust" is undoubtedly one which has still to be reckoned with and the high price of maize has encouraged growers to plant that crop, instead of wheat, in those areas in which both can be grown. Experience shows that the higher altitudes are more suited to wheat growing, but in those areas further settlement and development is required to secure a substantial increase in wheat production.

The yields per acre, though still very low, show a generally upward tendency. With improvement of varieties, particularly in regard to rust resistance, greater confidence will be shown in the wheat industry. The smaller labour requirements for the wheat crop, as compared with maize, is now persuading farmers to extend the area of wheat.

One large new Wheat Mill was erected and towards the end of the year it was evident that supplies of local wheat would fall short of the capacity of the wheat mills, the shortage being partly due to low yields on account of drought in some districts and "rust," notably in the Trans Nzoia.

Wheat growers made an earnest endeavour to steady the market and agreed to a price acceptable both to the producer and the miller, but the agreement broke down under competition for the supplies from outside sources, with the result that the price of wheat rose from Shs. 22 to about Shs. 28 per bag.

That was followed by a rise in the price of flour, though not so great as might have been expected due to the policy of the largest mill in not taking advantage of the position. It is noteworthy, however, that the price of the loaf has not risen.

The protective duty on wheat formed a subject of enquiry by the Economic and Finance Committee. It was seen that the present supply of wheat from Kenya was only slightly over 50 per cent. of the requirements of Kenya, Uganda, and Tanganyika, and that an additional area of about 20,000 acres of wheat would require to be grown in order to supply the flour requirements of those countries from locally grown wheat. It was considered that that was likely to be achieved within a few years.

A great deal of work—to which further reference will be made under "Plant-breeding"—has been done, both in hybridization and selection to secure wheats which are rust-resistant to the three main forms of rust. That matter is a complicated one, probably more so here than elsewhere, owing to the varying "rust" conditions found in different districts, but some success has already been achieved. Bulk issues have already been made of a few varieties and in the course of the next few years lots should be available from the hybrids, many of which at present show great promise.

In an area of the Trans Nzoia where good crops of wheat have been grown during the last three years "rust" caused great damage even among varieties which had hitherto apparently possessed considerable resistance to *P. graminis*. Weather conditions at a critical stage of the crop were particularly favourable to the "rust," but while a repetition of these conditions may appear occasionally it would not appear that farmers would be justified, on present experience, in giving up the crop in that area.

With improved milling and greater experience on the part of bakers in the handling of the flour palatable loaves of good quality are being made in quantity wholly from Kenya flour.

BARLEY.

The progress made with this crop has been slow, but that an advance has been made is evident from the display of barleys at the Nakuru Show. It has been proved that "Malting" barley of good quality can be grown and satisfactory yields have been obtained, but care must be taken to prevent discolouration during harvesting, and damage to the grain in threshing.

COFFEE :

The season has, on the whole, been exceptionally dry, especially in the largest coffee producing areas. Plantations have now passed through two extended periods of serious drought during the last ten years, and although losses have been suffered from crop failures, partial or otherwise, it is satisfactory to know that any drought likely to be experienced is not calculated to cause permanent loss or damage to the plantations. On some Estates a proportion of the crop was lost through shortage of labour, particularly during the picking season. Owing to these adverse weather and other conditions there was a drop of 25,673 cwts. in coffee exports, and for the same reason the quality both in respect of size and "liquoring" was below the standard. There was also a drop in value of about Shs. 17 per cwt. The result has been a reduction in export value from £799,420 in 1924 to £723,180 in 1925.

Nevertheless the industry is in a sound position, and but for the uncertainty in regard to supply of labour in the future more rapid progress would be made in extending the coffee acreage. That, however, increased from 60,054 acres in 1924 to 65,140 acres in 1925. The importance of the industry to the Colony is reflected not only in the value of the export trade, which amounts to 31% of the total for agricultural exports, but in the fact that 40% of the European owners and occupiers of land, *viz.*, 696, are coffee growers.

There is evidence of better management in coffee plantations, and improved methods, particularly in pruning and shading, accompanied by saving in labour, are being introduced. Attention is also being given to manuring and the Department is assisting as far as lies in its power by laying down experimental plots in co-operation with growers and by giving advice.

The risks due to diseases and pests are not lessened but rather increased, with the continued growth of the industry. During the last two seasons great anxiety has been felt owing to the spread of the Coffee "Mealy bug." The effort of several Officers of the Department was centered on finding measures of control or eradication, and the additional Entomologist was instructed to concentrate his whole attention upon this pest. After extended investigations and trials of various methods it would appear that there has been found a satisfactory substance—the residue from the distillation of creosote—which will prove to be an efficient ant repellent. In effect the disturbance and destruction of the natural enemies of the mealy bug is thus prevented, and, through biological control it is anticipated that the pest will cease to be a menace.

Other diseases and pests require constant vigilance and attention, but the staff of the Department is inadequate to perform the volume of work which thorough inspection demands.

During the year the Senior Coffee Officer inspected 372 plantations, had 237 interviews at his Office, sent out 317 letters of advice, gave 6 Field Demonstrations and Lectures at various centres, and during an absence of 165 days on duty travelled 5,808 miles, chiefly on inspection work. In addition a large number of inspections were made by a Temporary Inspector in connection with "Mealy Bug" investigations. In co-operation with planters the Coffee Officer is undertaking experimental work which is already proving to be of great value to the industry.

Notices were served upon 17 occupiers of Coffee Plantations under the diseases of Plants Prevention Ordinance.

SISAL.

The industry is in a flourishing condition and substantial progress is being made.

The total area under Sisal, as at June 30th, 1925, was 52,852 acres of which 35,610 acres were over 3 years old, and therefore available for cutting. The increase in area for 1925 was 7,549 acres or 16.66 per cent. over the previous year.

In exports of Fibre the quantity has risen from 228,305 cwts. in 1924 to 287,260 cwts. in 1925 and in value the corresponding figures are £396,777 and £531,129.

Directions in which advancement might be made with great advantage to the industry are improved decortication to prevent waste of fibre, and the standardisation of grades in order that preparation of the fibre for market may be undertaken along the best lines and so that claims against sellers may be settled with satisfaction to all parties. The invention of Decorticating machinery calculated to reduce the present high percentage of waste is receiving the attention of Engineers and others.

This Department has endeavoured through the London Hemp Association, to get Standard Grades, acceptable to the Trade, set up by the Merchants.

Another direction in which much valuable information might be secured would be the physiological study of the plant with a view to determining the optimum period for cutting, both in regard to yield and quality. The Kenya Sisal Growers Association recently formed should be able to advance the interests of the industry along these lines and in many other ways.



FLAX.

The area under flax fell from 5,438 acres in 1923-24 to 3,029 acres, in 1924-25, and the exports from 14,577 cwts. valued at £40,887 in 1924 to 6,412 cwts. valued at £14,577 in 1925.

This crop is now almost eclipsed, others more profitable having displaced it, and, even in areas where it has proved to be a most suitable crop, growers have given it up largely on account of the continued depressed state of the market and low prices. The production of line seed has also not been viewed with favour owing to the fluctuating market.

Early in the year it was decided to apply compulsory grading to flax with a view to giving the industry every advantage, but the output steadily decreased and became so low that it was decided to terminate the appointment of the Flax Officer at the end of the year, and also to withdraw the facilities for grading.

That Officer has been engaged on conducting experiments upon improved fibre producing varieties from Ireland and the United States of America, and while not employed on flax he has assisted in Maize selection work.

COCONUTS.

There is practically no increase in area, but some of the new plantations are coming into bearing. It is impossible to estimate the increase, in Non-European owned plantations, but it is considered to be small. There was a decrease in the export of copra—from 39,271 cwts. valued at £46,473 in 1924 to 31,295 cwts. valued at £35,915 in 1925, owing probably to the increasing extent to which it is used for the manufacture of soap locally.

There is no evidence to show that the pest "Coconut Beetle" is spreading. Isolated cases of "bud rot" occur, and any investigations of "husk-splitting" led to the conclusion that it was due to cultural conditions.

SUGAR CANE.

There has been an increase of 1313 acres during the year, the total area standing at 6556 acres as at June 30th, 1925.

The production of sugar is increasing, but it is still only meeting a proportion of the local requirements. In the year 1924-25, 57,820 cwts. of "crystallised" sugar were produced, and 27,161 cwts. were imported in 1925 for Kenya and Uganda. As a like quantity was imported in the previous year it would appear that the increase in local consumption keeps pace with the increased output from the local sugar mills. The quality of the sugar manufactured is not always satisfactory, but improvement in that direction may be expected.

That serious disease in Sugar Cane—"Mosaic"—has been determined in one area in the Colony, and on one estate in particular extensive areas and several varieties are affected. Through legislative action and advice strong measures are being taken with the object of eradicating it at this stage.

WATTLE.

Again there is an increase—18,548 cwts.—in the quantity of bark exported, the figures for 1925 being 89,964 cwts. valued at £ 28,991. In addition tannin extract amounting to 9203 cwt. and valued at £ 2,966 was exported.

There is no evidence that planting for replacement is taking place on a scale sufficient even to maintain the present output.

TEA.

Tea planting is recorded for the first time in the last Agricultural Census, the area as at June 30th, 1925, being 382 acres, and a small quantity, viz. 1341 lbs. of Tea, was produced and marketed locally. The attention which is being given to this new industry is best reflected in the importations of Tea Seed. For 1925 permits were issued for 43 480 lbs.

Several influential Companies possessing experience in Tea-growing elsewhere have secured large interests in the Colony and have commenced development of Tea estates chiefly in the Kericho and Limuru Districts. They express confidence in the suitability of soil and climatic conditions for the production of tea of high quality, but they feel less confident in respect of the necessary supply of labour.

OTHER CROPS.

To "Castor" and "Sunflower" attention has been given. In the case of Castor, difficulties in harvesting and disappointment in yields have rather checked the enthusiasm of a few growers, and in that of Sunflower, the handling of a large crop presents difficulties and it is not yet shown to be a more profitable crop than Maize.

Ere long the necessity for growing leguminous crops for the purpose of maintaining soil fertility will be realised and farmers would be well advised to start by growing small areas, either of velvet beans, Cowpeas, Lupins, &c., for the purpose of furnishing a supply of the seed which will be required for more extensive sowing.

The droughty conditions in the pastoral areas during the last two years when milk supplies were greatly reduced point to the need for conserving fodder and making silage, or growing root and kale crops, even though they may not be required in ordinary seasons.

HORTICULTURE

The increase in the area of orchards is negligible, but citrus and miscellaneous fruit trees have given place to deciduous fruit, of which the number of trees has nearly doubled during the three last years. The Department assisted the largest fruit grower in the Colony in the export of an experimental shipment of plums amounting to 500 boxes. Useful information was obtainable indicating that Kenya Plums were acceptable on several European markets. After meeting all charges a return of Shs. 1/67cts. per box of about $4\frac{1}{2}$ lbs. weight was obtained at the Railway station in Kenya.

INDIAN AGRICULTURE.

The Indian Agricultural Community is chiefly centred in the area between Kisumu and Muhuroni, where they occupy about 12,000 acres of land, and on the Coast. Their activities in Maize, Sugar Cane and Coconuts contribute comparatively little towards agricultural production, but there are owners of large numbers of transport oxen and vehicles for the conveyance of agricultural produce.

NATIVE AGRICULTURE.

During the year the Department has continued the policy of encouraging economic crops which have an export value, at the same time food production in reserves has received attention. The effort is primarily educational and the chief line of action is through Agricultural training and Demonstration Plots. The establishment of "seed farms" in connection with native agricultural schools would serve a useful purpose and provide opportunities for giving a good practical training to the native pupils.

After protracted discussion and full consideration approval was given for the introduction of a Bill intended to control and improve crop production and livestock with particular application to Native areas, but where considered necessary it may be applied elsewhere. The main objects of the Bill as stated are:—

"This Bill confers powers upon Government actively to improve the standards of production in the Colony, and to forbid the growth of crops or plants which are known to be deleterious or in other ways undesirable, also to preserve permanent food crops from destruction."

"Through it cultural methods calculated to increase production could be laid down and in order to prevent immature produce in bad condition being exposed for sale the time of marketing any particular kind of produce may be specified."

"The stocking of land beyond its carrying capacity with resultant poverty and deaths of stock may be prevented, and the number, etc., of livestock which may be kept on a given area can be defined. Generally also provision is made for determining the manner in which livestock improvement should be carried out."

At the time of writing the Bill has been passed by the Legislative Council.

STAFF, DISTRIBUTION OF.

Nyanza ... Four Agricultural Supervisors (of whom one was on leave the greater part of the year), with 10 Native instructors and 12 field Apprentices.

Kikuyu .. Two Agricultural Supervisors, with 13 Instructors.

Ukamba
(Teita)... One Agricultural Supervisor, with 3 Instructors.

Coast ... One Senior Agricultural Supervisor, with 2 Instructors, and 6 field apprentices.

At Bukura there were 32 apprentices and at Scott Agricultural Laboratories 40 apprentices in training.

In addition the following provision is made for Veterinary services in Native Reserves.—

- 1 Senior Veterinary Officer,
- 2 Veterinary Officers (whole time),
- 1 Veterinary Officer (part time),
- 6 Stock Inspectors (whole time),
- 2 stock Inspectors (part time),
- 32 Native Scouts.

In addition Veterinary Officers stationed in European areas serve the needs of adjacent native reserves.

WEATHER CONDITIONS.

Nyanza.—The rains commenced normally in March, but in April drought was experienced which gave rise to anxiety. It was severely felt in the locations bordering the Gulf Shore. Further drought was experienced in August and September, but heavy rain fell towards the end of the year. The season, therefore, was not good, but no actual famine was experienced over the Province as a whole.

DISTRIBUTION OF SEEDS TO NATIVE RESERVES, 1925.

STATION.	Maize.	Beans.	Wheat.	Cotton.	Groundnuts.	Simsim.	Rice.	Chillies.	Onions.	Cabbage.	Potatoes.	Buckwheat.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
KERIO PROVINCE...	960	960	...	...	120	...	...	...	...	...	...	...
Eldama Ravine ...	...	60	...	...	60	...	...	...	...	...	...	...
Kabarnet ...	360	600	...	...	60	...	...	...	...	...	...	...
Kacheliba ...	600	300	...	...	...	...	...	...	...	...	...	...
KIKUYU PROVINCE	32,000	3,200	1,000	150	72	100	200	43	10	...	...	1,000
Fort Hall ...	...	...	1,000	150	...	100	200	38	5	...	...	...
Nyeri ...	7,000	1,200	...	...	72	...	...	5	...	...	...	...
Kikuyu ...	12,000	...	...	...	...	...	...	...	...	...	...	...
Kyambu ...	4,000	...	...	...	...	...	...	...	...	...	...	...
Dagoretti ...	9,000	...	...	...	...	...	...	...	...	...	...	...
Embu... ..	...	2,000	...	...	...	...	...	...	5	...	...	1,000
NYANZA PROVINCE	46,000	2,000	4,400	...	500	8,000	8,000	...	17	2	540	...
Kapsabet ...	4,000	...	...	...	...	...	...	...	12	2	540	...
Kericho ...	...	...	2,400	...	...	...	...	...	5	...	...	...
Central Kavirondo ...	2,000	2,000	...	...	...	...	...	...	...	...	...	...
South Kavirondo ...	...	...	2,000	...	500	...	...	...	...	...	...	...
North Kavirondo ...	40,000	...	...	...	...	8,000	8,000	...	...	...	...	...
COAST PROVINCE...	6,600	400	...	34,467	26,600	8,400	6,000	...	3	...	...	...
Malindi ...	...	...	...	22,400	16,000	4,400	...	...	3	...	...	...
Kilifi ...	...	...	...	6,720	6,000	...	2,000	...	...	...	...	...
Kwale ...	2,000	400	...	4,480	4,000	4,000	4,000	...	...	...	...	...
Mombasa ...	4,600	...	...	...	...	...	...	...	...	...	...	...
Lamu ...	...	...	...	867	...	...	...	...	...	...	...	...
UKAMBA PROVINCE	1,200	1,500	...	400	400	...	500	18	20	...	...	...
Voi ...	1,200	1,500	...	400	400	...	500	18	20	...	...	...
TOTAL PROVINCIAL ISSUES	86,760	8,060	5,400	35,017	27,092	16,500	14,700	61	50	2	540	1,000
SCHOOLS.												
Ogada, Kisumu ...	200	80	...	8	25	30	...	...	...	...	...	...
A. I. M., Nyakach, Kisumu ...	200	40	...	...	25	15	...	...	...	...	...	...
Bunyore, Kisumu ...	1,000	480	...	...	400	200	...	...	...	...	...	...
Ali Bin Salim School, Malindi ...	...	...	...	...	15	15	...	...	...	...	...	...
A. I. M., Litein, Kericho ...	60	60	...	...	...	...	...	1	...	...	...	...
C. M. S., Mutira, Fort Hall ...	14	10	...	...	6	4	...	$\frac{1}{2}$	...	...	...	...
Catholic Mission, Nyeri ...	15	20	...	...	12	4	...	...	...	...	...	...
C. M. S., Embu ...	...	...	...	360	...	120	...	...	...	...	...	...
Native School, Machakos ...	150	400	...	80	250	150	...	...	...	...	...	...
Narok School, Narok ...	225	...	200	...	...	...	...	...	...	...	...	...
Church of Scotland Mission, Tumutumu...	60	60	...	...	...	...	...	...	...	...	...	...
TOTAL ISSUES	88,684	9,210	5,600	35,465	27,825	17,038	14,700	62 $\frac{1}{2}$	50	2	540	1,000

Kikuyu.—Generally a below average season was experienced, particularly in the Southern Kikuyu Reserve so that the surplus of production was not great. In the Ukamba and Teita area the season was moderate.

Coast.—With the exception of the area lying south of the Railway line the season has been fairly good and the production of foodstuffs was up to average.

A famine in the area known as Digo was feared due to the very poor rainfall experienced in the latter part of the year.

On the whole Native cultivators have not enjoyed even a moderate season.

Crops.—The chief crops grown by natives are Maize, Simsim, Beans, Groundnuts, Cotton and a number of minor crops which are utilised mainly as foodstuffs. A greater interest is being shown in wheat, the growing of which is being encouraged. The dietary of natives in their own reserves is not infrequently far from satisfactory, and the introduction of food crops which would improve the ration should receive attention.

ISSUE OF SEEDS.

As heretofore issues of seeds have been made, a number of Missions and Schools having been included as places to which an issue is of value educationally. Most of the seed issued is purchased by the Department but there is increasing difficulty in securing the right class of seed supplies at the right time and in safely storing them against issue.

A beginning of the system of seed farms in reserves has been made. At the Bukura Farm and at the Scott Agricultural Laboratories a surplus of seed is produced which is issued in the reserves. An extension of the Agricultural activities and educational work of the Department in native Reserves should in time almost eliminate the need for a seed vote, the money thus saved being diverted to the Training Farms which also function as Seed Farms.

The table below shews the quantity, variety and distribution of seed issued by the Department.

IMPLEMENTS, &c.

As a result of the issue of implements for demonstration purposes in Kavirondo especially, there has arisen a good demand for small ploughs and scufflers. In addition eight water power grinding mills have been erected by natives, a large number, 100 it is said, of hand-driven grist mills have been bought. There is good evidence of the effect of the influence exerted in the past years, and it is hoped that natives will persevere with their new acquisitions.

MAIZE.

Issues of "Flat White" maize have again been made to enlarge areas in which that type is now grown almost exclusively. Deterioration due to mixing of seed is observable, and will have to be frustrated in the future.

Maize is often harvested too early in the Reserves, and it is marketed almost immediately when it may contain up to 20% moisture. Buyers naturally suffer a serious loss, which they recoup by subsequent purchase of drier maize at a very low price. It is useless to expect the competition of buyers to correct such a loss to the grower, so that the producer eventually suffers. This does not greatly encourage the native to produce a large surplus, but with improvement in communications and considering the fact that a number of natives are now engaging in transport work on their own account, there should be an improvement, in the price of produce to the grower.

In Kikuyu issues of Maize to the extent of 25,000 lbs. were made.

On the Coast also issues have been made. There has been a revival of the Maize trade from Malindi and Kilifi. Large quantities of Maize may be grown near Sabaki river and there is evidence that natives in that area are increasing production.

COTTON.

The issue of seed for this crop is controlled, all seed being approved by the Department. A large quantity of new seed was secured from Uganda towards the close of the year. The 1924 plantings, harvested in 1925, gave a production of 2,300 bales for the Colony and practically all native grown. The price for "A" quality seed cotton varied from 23 to 18 cents per pound, getting lower towards the end of the season. The purchases of seed cotton were as follows:—North Kavirondo, 1,431,957 lbs; Central Kavirondo, 1,305,403 lbs; and South Kavirondo, 40,000 lbs.

The area planted in 1925 showed a decrease, as those "shambas" planted by Natives in unsuitable places have been eliminated.

Planting was arranged for February and March for the Gulf Shore, but owing to drought the seed did not go into the ground until May, and, as the season was a very poor one, a failure is to be recorded all round the Gulf.

In the Sio-Samia area, and North Kavirondo, planting takes place much later and here again the crops suffered from the drought of August and September so that a reduced crop is to be expected. Buying commenced towards the end of December, and the low price paid, which however was quite in consonance with Liverpool Market prices, causes natives much dissatisfaction to the extent that many will probably refrain from planting in 1926.

In the Taveta area where there is a small Ginnery a very small crop was produced. The natives here appear to be too prosperous to bother about Cotton, and therefore a crop which they could grow to perfection is being ignored. As irrigation is available for these people it is a matter for regret that they are not more industrious and progressive.

At Malindi the crop was affected by drought, only 150,000 lbs. of seed cotton having been brought in at the close of the year. This quantity is sufficient to keep the ginnery working full time for 30 days.

SIMSIM.

This crop is gaining in popularity, particularly in Kavirondo where a tendency is shewn for it to displace cotton. The range of soils and conditions under which simsim may be grown is greater than is the case with cotton. A moderate crop was produced in 1925, some 60,000 cwts. being exported. The crop is grown mainly in Kavirondo.

On the coast preparations have been made to increase the output of yellow simsim by means of a large seed issue.

The increasing practice of adulterating simsim with dirt and "trash" is noted and is in part due to the method of buying at night.

GROUNDNUTS.

This crop has been introduced into several new areas, but it is making headway only slowly. It is really suited only to light friable soils. The yield from the crop was poor in 1925, as reflected in the export returns.

BUCKWHEAT.

Small quantities of seed of this crop have been introduced into many reserves, mainly as a means for the alleviation of famine. It gives a large yield of grain within 10 weeks of sowing and is being taken up rapidly. The quality of grain is generally good and there may be an export surplus in the future.

WHEAT.

This crop too has been introduced into several areas, in which it is hoped that it will become a staple food crop besides being a valuable local commodity. It is the endeavour of the Department to supplant food crops of the "bird seed" type, like "Wimbi" by more nutritive kinds, such as Wheat.

RICE.

The rice crop in the Coastal area has suffered greatly from adverse weather conditions during the last three years. Indeed it is doubtful whether its cultivation can be greatly extended without considerable expenditure upon irrigation works. In other parts of the Colony considered suitable, some distribution of rice seed has been made, but little progress can be recorded, the crop not being in favour with the native cultivator.

The estimated value of Agricultural Exports of Native origin for the last four years are shewn hereunder :—

				1922.	1923.	1924.	1925.
				£	£	£	£
Animals	...	...		1,200	10,000	20,000	16,800
Copra & Coconuts	...	...		12,000	10,280	35,000	28,000
Cotton	...	...	...	...	...	11,860	41,000
Groundnuts	...	...		20,000	24,000	26,000	19,000
Maize	...	...		73,000	120,000	130,000	100,000
Milletts	...	...		1,000	4,000	300	865
Pulse	...	...		7,000	12,000	15,000	16,000
Simsim	...	...		4,800	22,000	84,000	65,000
Hides	...	...		45,000	60,000	121,000	210,000
Skins	...	...		5,000	3,000	30,000	50,000
Oil-Simsim	...	...	...	...	2,400	2,200	3,000
Potatoes	...	...		5,000	3,000	4,000	4,000
Miscellaneous	...	...		1,000	1,000	1,000	1,000
Total	...	...		176,000	271,680	480,360	564,665

Thus about 57 per cent of the increase in value of Agricultural Exports in 1925 falls under "native" products. It should be noted also that the value of native agricultural produce sold for local consumption amounts to a large figure.

EDUCATIONAL.

The two training institutions Bukura and Scott Agricultural Laboratories have been developed during the year.

At the Bukura Farm much progress towards the equipping of the property has been made, and it is hoped to develop until one hundred pupils may be accommodated. The scope at the Scott Agricultural Laboratories does not permit the number of pupils to be augmented.

Proposals under consideration for the development of native agricultural education include establishment of a training institution in the South Nyeri area, large enough to provide for a "seed farm", to serve the needs of the Kikuyu, Embu and Meru tribes. Another should be opened to meet the needs of the Coastal area. A further proposal is that the special facilities available at the Scott Agricultural Laboratories, with its experimental grounds, should be used for more advanced instruction to selected pupils who have received a preliminary training at the other schools. Apart from the requirements of the Department of Agriculture in respect of well trained native agricultural instructors a great need exists for native teachers in Agriculture in the village schools and at Mission stations, and it is considered that a scheme of the kind outlined above would, in time, meet the demand, but owing chiefly to the backward state of even elementary education among the natives there is at present a fundamental difficulty in procuring native pupils for agricultural training who have had even the most elementary education.

GENERAL.

The system of agricultural work is now taking the following shape which it is hoped will not be altered in principle for many years, as it is important that there should be continuity of policy. The Agricultural Training School of the Province is the centre from which agricultural educational work is carried to the various locations. The Supervisors in charge, with their assistants, are responsible for the production of seed for issue in the reserve. As seed production increases the practice of purchase of seeds for issue will gradually be eliminated.

In the various districts demonstration plots in charge of trained Native Agricultural Instructors are established, on which the cultivation and preparation of land, planting, and harvesting of crops are demonstrated. Each demonstration plot is inspected once a month by the Supervisor when on safari and where possible, and when useful, "Baraza" demonstrations are held, so that a definite organisation is maintained. All demonstration shambas and native instructors in the Kavirondo and Kikuyu Reserves are linked to the Central Training Station. On the Coast and those areas in which no seed farm or training school has been established a modified system is followed.

NATIVE AGRICULTURAL SHOWS:

Native Agricultural Shows were held in Nyanza at Maseno; in Kikuyu at Fort Hall and Embu; in Ukamba, at Bura; on the Coast, at Kwale, Kilifi and Malindi. The "Grants-in-Aid" made by the Department to these Shows amounted to £231 in 1925.

The educational value of these Shows is increasing yearly and where Shows have been held for the last two or three years the improvement in quality of exhibits and the voluntary elimination of poor exhibits is marked.

The gatherings offer an opportunity for the Administrative and Agricultural Officers to stress the necessity for more and better production and they also serve as an index of progress in the reserves generally.

Small money prizes are given and usually small medals. An innovation is to present first and second prize winners with some small implements, the use of which it is desired to introduce in Reserves.

The organisation of these Shows is very simple but the preparation of a Show ground each year is a tax on the time of Administrative Officers. As Shows are likely to become Annual events some permanence to construction should be given, and the planting of trees and general preparation of the show ground should be improved each year. It is proposed in North Kavirondo that the Chamber of the Native Council should be erected on the Showground and that place be made a central meeting point for the tribe. Thus the Showground of the district should have more than a passing utility.

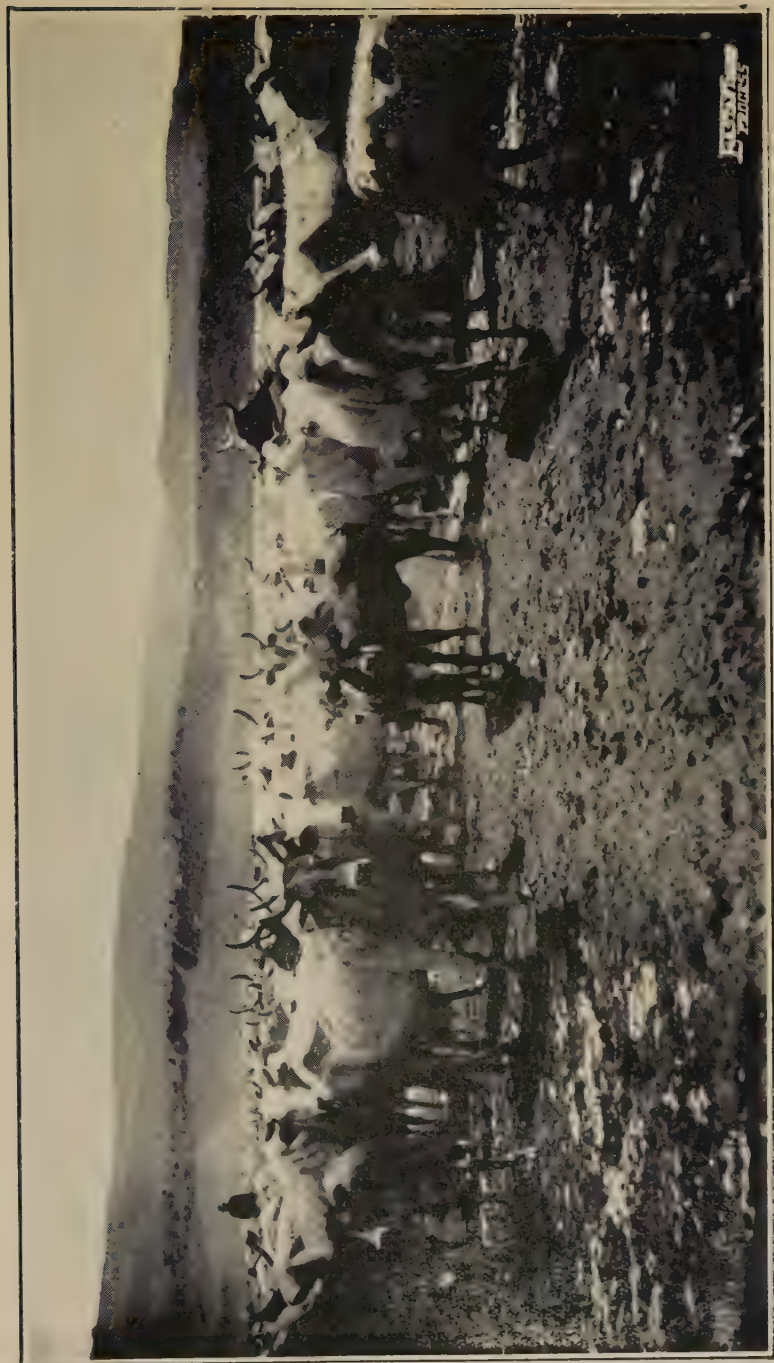
NATIVE LIVESTOCK.

The estimated Stock in the possession of Natives, other than those on European holdings, is as follows:—

Cattle	...	...	3,200,000
Sheep	...	...	2,500,000
Goats	...	...	3,500,000
Horses	...	...	200
Mules	...	...	300
Donkeys	...	...	35,000
Camels	...	...	150,000

There is evidence to show that cattle, sheep and goats show a steady if small annual increase, but in the circumstances it is possible only to quote approximate figures.

These estimates, are however, believed to be on a conservative basis.



A Herd of "Native" Cattle.

The prices realised by natives for their stock have advanced considerably, indeed meat prices for local consumption are higher than in stock-raising countries throughout the world where the quality of the meat is much higher than here. Oxen for draught purposes have also reached a price far above their proper value. A peculiar position exists inasmuch as higher prices do not tend to increase supplies; on the contrary the greater the sum of money paid to the native owner for his stock the smaller is the number which he sells, as he is disposed to sell only a sufficient number of animals to raise a certain sum of money. That is one explanation of the overstocking of some pastoral areas. Through the "Crop Production and Livestock Ordinance, 1925" previously referred to, it is intended to exercise some pressure upon natives whereby they may come to realise the economic value of their stock, and when they should be marketed in order to avoid depreciation in value and losses from poverty, old age, &c. Particularly during the last two years natives have come to realise the value of preventative measures against disease. With that forward step the enormous losses previously suffered in the reserves should be reduced and stock may be expected to increase in numbers.

The improvement of native livestock is one to which attention should be given, but it should be realised that progress can, in any circumstances, only be slow. The endemic nature of East Coast Fever in the Reserves and the impracticability of attempting to deal with it through fencing and dipping prevents the adoption of the ordinary methods of improvement through the introduction of sires of "improved" breeds. The improvement of the type of native cattle, both in size and quality, can best be achieved through selection among the native type and fixing it, and the castration of "weedy" bulls.

The time is opportune for the establishment of a herd of native cattle to demonstrate how they can be improved and for the improvement of native sheep through introduction of *e.g.* Karakuls. On a stock farm maintained for this purpose facilities should be afforded for the training of pastoral tribes in animal husbandry, just as at existing Training Schools other tribes are taught field husbandry.

HIDES & SKINS.

Instruction in the better preparation of hides is being given chiefly through the Veterinary staff. Pamphlets have also been made for the guidance of administrative officers, and those engaged in the trade. Some of the Hide and Skin firms are also encouraging the native to give greater attention to the matter, but it presents some difficulties at this stage. A large part of the trade in the reserves is so inefficiently conducted and organised that the native finds that he gets no better price for the well prepared hide, indeed he may suffer some loss

owing to the lower weight. Grading really only takes place after the hides have passed out of the hands of the original buyers. Slow as it is, there is, however, steady improvement, and in time the result of the efforts being made will become more apparent. The work could, however, be expedited if an officer were appointed specially to study the subject, including its commercial side, and to organise and direct the work in co-operation with those engaged in the trade.

The value of hides exported has increased from £177,888 in 1924 to £260,888 in 1925, and of skins from £27,333 to £54,605.

GHEE.

Owing to the movement of ghee between Uganda, Tanganyika and Kenya, figures cannot be furnished showing the progress of the industry in Kenya. According to the Trade Returns the importations for Kenya and Uganda fell by 1283 cwt., though the value was considerably higher on account of the rise in price.

Administrative Officers in the Masai Reserve, Lumbwa, South, Central and North Kavirondo, also Machakos, have given the production of Ghee some attention with assistance of the Veterinary staff and Agricultural Officers working in their areas.

Veterinary Scouts are at present trained in Ghee making in the reserves by Stock Inspectors, the butter and milk being obtained from Native Chiefs or from markets. Improvement in the mode of preparation, particularly as regards cleanliness, is the first consideration and the cleanliness of such native utensils, petrol cans, &c., as are used is of first importance. Demonstrations are given at native markets and the development of the industry is in the hands of those natives who will procure supplies of butter or milk from their neighbours and who will prepare the Ghee under sanitary conditions

A most expensive but more efficient method is to establish separating stations at central points to which natives will bring the milk from their cattle for separating. Stations of this kind have been established at Narok, Kisii and in Lumbwa. Ghee making made under this "separating" system is generally of higher quality.

The school established at Narok, in the Masai Reserve, has been giving instruction in Ghee making on up-to-date lines for the last three years.

During 1925 the production of milk in the reserves has fallen owing to drought, natives do not feed cattle for milk production, although that is a feasible development of the work.

Some Ghee, approximately 100,000 lbs. per annum, is produced on European farms, particularly in areas far removed from rail and consuming centres.

Progress is undoubtedly being made and there is increased production as well as improvement in quality, but, on account of the nature of the trade, figures of real value cannot be quoted.

More cannot be done for the development of the Ghee industry without additional resources in respect of staff and facilities. A number of Officers who cannot profess to have a special knowledge of dairying nor of Ghee production have done a lot of useful work in promoting ghee making in addition to their ordinary duties. To organise the work properly the services of an Officer trained in the Science and Practice of Dairying should be available in this Department. After investigating the best method of manufacturing ghee under existing conditions he would then be able to promote the effort through different channels.

GENERAL.

Speaking generally, the position in the native reserves is improving, though inevitably at a somewhat slow rate, but there is evidence of increasing prosperity.

It is pleasing to note with what enthusiasm Administrative Officers have identified themselves with the furtherance of Agricultural development in reserves. The proposals from time to time put forward to increase the scope of work in reserves are quite beyond the resources of the Department and it is therefore necessary to examine closely what are the most important services to be rendered at the present time, and which are likely to be of the greatest and most immediate benefit both to the State and the individual.

The maintenance of inherent fertility, and the prevention of destruction to pastures, are matters which will require attention in some native reserves.

LIVESTOCK INDUSTRY.

Reference has already been made to native-owned Livestock under the head "Native Agriculture."

The following table shows the numbers of Livestock owned by Europeans as at June 30th, in each year :—

	1921.	1922.	1923.	1924.	1925.
Cattle—Total ...	161,210	172,397	190,140	211,381	216,589
(a) Breeding stock ...	92,298	97,260	104,631	110,855	110,547
(b) Oxen ...	68,912	74,137	85,509	100,526	106,042
Horses ...	1,311	1,351	1,454	1,642	1,846
Mules ...	976	1,257	1,093	985	922
Donkeys ...	1,108	1,512	1,260	1,213	1,336
Sheep (Wool bearing) ...	98,168	109,748	112,046	135,916	140,725
Sheep (Native) ...	16,136	24,137	35,014	32,132	38,071
Goats ...	4,323	5,130	6,258	4,618	5,372
Pigs ...	15,038	16,121	12,120	10,608	8,564
Poultry ...	33,772	34,371	38,685	38,910	31,150

The percentage increases of cattle for the last four years is, 2·46, 11·17, 10·29, and 6·94 respectively. The drop in 1925 reflects the unsatisfactory position which in some respects obtains in regard to the cattle industry. The increase was confined to oxen. It is thought that the absence of an increase in “breeding stock” may be due to the advance in prices and improved demand, which gave owners an opportunity of culling their stock and of disposing of them to native buyers, also for slaughter purposes. The purchase of female stock by European stock owners for breeding purposes from outside sources practically ceased.

The triennial Agricultural Census shows a steadily increasing proportion of “grade” to “native” type on European farms, but the proportion of Purebred to either has not increased.

The increase in wool bearing Sheep is also comparatively small, 3·54 per cent.

Pigs show a substantial decrease, but with the rise in price of “porkers” and “bacon pigs” it is expected that the present shortage will disappear.

The following table gives the production and sale by Europeans of certain Animal Products, excluding Meat &c. during the last few years :—

Year.	Milk.	Cream.	Butter.	Cheese.	Ghee.	Bacon & Hams.	Wool.
	Galls.	Galls.	lbs.	lbs.	lbs.	lbs.	lbs.
1924-25 ...	371,692	85,557	303,085	92,994	108,153	364,552	461,586
1923-24 ...	372,103	107,669	252,990	93,248	112,815	...	427,266
1922-23 ...	351,920	43,352	246,544	155,452	97,439	...	445,024
1921-22 ...	242,234	36,985	236,703	65,520	16,287	343,045	330,781



Friesland Cattle at Limuru.

The increases over the triennial period are substantial in all cases. As compared with the previous year the sale of milk and cheese remains practically constant. There is a reduction in the sale of Cream and Ghee, and a substantial increase in that of butter. It should be noted that "Creamery" butter is not included in the above figures. The Cream sold represents that output. In wool there is a normal increase.

The value of these products in 1924 is roughly estimated as follows:—Dairy Products, £88,886. Bacon and Hams &c., £23,700. Wool, £31,320.

IMPORTATIONS.

The importations of purebred cattle for the last three years are as follows:—

	1923.	1924.	1925.
Shorthorn Bulls	3	11	24
„ Cows & Heifers	2	13	13
Friesland Bulls	15	2	49
„ Cows & Heifers	6	...	36
Ayrshire Bulls	...	2	16
Hereford Bulls	...	...	6
Aberdeen Angus Bulls	...	2	2
Afrikander Bulls	...	...	2
Jersey Bulls	...	2	8
Kerry Bulls	...	...	1
„ Cows & Heifers	...	...	3
Red Poll Bulls	...	...	3
„ Cows & Heifers	...	...	1
Swiss Bulls	...	2	...
TOTALS	26	34	164
Total Bulls	18	21	111
Total Cows & Heifers	8	13	53

The costs of importation, varying from £30 to £80 per head, is a charge which breeders who require a purebred bull of average quality for grading purposes should not be called upon to

meet, and it is considered that to get on a satisfactory basis females should be imported in sufficient numbers to breed the bulls required in the Colony, other than high class bulls for purebred herds.

There is definitely a shortage of purebred Bulls, and as a consequence many breeders have perforce been obliged to use grade bulls.

In view of the position and the failure of private breeders to meet the demand, consideration is being given to the advisability of re-opening the Government Stock Farm, Naivasha. It is felt that the improvement of the Dairy cow is fundamental to the success of the Dairy Industry, which is now being fostered, and that the necessary progress is not being made.

A Co-operative Society was formed for the establishment of a Creamery at Naivasha and it will start operations early in 1926. With that addition to butter production there should be no shortage of butter in future, prices to a consumer should be steadied at a lower rate, and with the facilities afforded through the Government Cold Storage at Kilindini, surplus butter can be exported to greater advantage.

During the year the price of meat advanced considerably and at times the supply fell far short of the demands, particularly in Nairobi. As already mentioned, the price of draught oxen went far above their real value, owing to the demands for development purposes and the restricted output by native owners. Through the opening of the additional quarantine stations, where large numbers of oxen have been immunised against rinderpest and pleuro-pneumonia, it is hoped that the supply will increase.

Through greater purchasing power among the native community and contact with the Europeans, from whom they receive meat in their ration, the natives in Kenya are buying and eating more meat. Uganda also offers a good market for slaughter stock and beef from Kenya. Indeed so great is the demand locally and in Uganda that the supply has fallen far short of the requirements and as a consequence trade has been restricted. There can be no doubt but that the best market for native bred cattle exists within East Africa and that should be exploited.

Much attention has been given in certain quarters to the development of an export trade in meat or meat products. It was not based upon a thorough understanding of the economic position. There are no indications that in the absence of a serious change in the world's meat supplies Kenya can develop an export trade for many years to come, and the value of cattle for the manufacture of bye-products, is very low indeed.

The importations of Sheep for the last few years were as follows :—1923, 86 ; 1924, 508 ; 1925, 233, of which there were 213 Merino, 14 Romney Marsh, and 6 Karakul.

Steps are being taken to open up large areas of pastoral land suitable for sheep-breeding, and in the course of the next few years a suitable definite advance should be seen in wool production.

Pig-breeding and fattening received an unfortunate check, but the prices offered cannot be said to be unprofitable. Pig keeping is really regarded as a "side line" and large farmers are not attracted to this branch, but with development along the lines of "mixed farming" and particularly on Dairy farms it may be expected that pigs will be bred and fattened in larger numbers.

The export of Living Animals, chiefly for the Coastal trade, fell during the year, due to the transfer to Italy of the port of Kismayu, from which the bulk of the animals were exported. Not shown in the Census returns is the export of cattle to Uganda, chiefly for slaughter purposes, and amounting to about 240 per month.

PLANT-BREEDING.

One Plant Breeder with a Junior Assistant was employed on this work for the first six months of the year during which over 3000 miles were travelled for the purpose of planting and supervising the trial plots and noting the incidence of rust on the experimental areas planted at various centres. Large numbers of hybrid kinds were planted out in the breeding cages at Njoro and the Scott Laboratories, totalling over 240,000 single plants. The examination and marking of these plants was partially completed when the Plant Breeder proceeded on sick leave.

Thereafter the plants were harvested and the grains counted and selection on appearance was done.

Yield trials on promising hybrids and selections were carried out at the Scott Laboratories, Kitale, Njoro, Gilgil and Machakos, whilst plantings at Makuyu and in the West Kenya area were failures owing to drought. The amount of work entailed in keeping track of strains, crossing, yield testing, and multiplying is very great, and when it is considered that for every average area in Kenya special work will need to be undertaken the magnitude of the task is evident.

In co-operation with growers the Department has been able to secure the issue of some promising varieties notably "Kenya Governor" and "Kenya Droop" in considerable quantity.

The rust problem overshadows all other problems with Wheat in Kenya and if it is to be overcome additional staff and facilities will be required.

Further reference to Plant-breeding was made under "Wheat" and "Maize".

GRADER & INSPECTOR.

Imports.—There was a substantial increase in the number of packages and their value imported during the year compared with the year 1924. The total number inspected was 3,256 valued at approximately Shs.200,000. Of these 130 packages were in transit to Uganda and five packages were destroyed by the Inspector.

Exports.—The Maize Grading and Conditioning Services were augmented by the completion of the Maize Drying and Cleaning Plant and the staff necessary for its maintenance. Since November 1st, when that Plant was started, 2,924 bags of wet and 501 bags of weevily maize were reconditioned amounting to just over 50% of the wet and weevily maize rejected by the Grader. The balance was sent to various Coast ports at which points there is a market for rejected maize.

14 export certificates for Beans, and 44 certificates for potatoes were given. In addition 31 certificates for Flax were issued.

Including £1,875 derived from Maize Grading fees the total revenue from Grading, Inspection and Conditioning amounted to £2,422.

Further references to the Grading Services were mentioned under "Maize."

ECONOMIC SURVEYS &c.

In connection with further proposals for extensions of branch railway lines, the Department undertook economic surveys of the areas to be thus served. Reports, chiefly made by the Deputy Director, were furnished upon the Turi-Sotik, Sergoit, Donyo Sabuk lines and upon the Machakos diversion. Preliminary investigation was also made for a branch line in North Kavirondo.

In addition inspections of land have been made on a large scale, chiefly in association with the Native Affairs and Lands Department.

Services of the kind mentioned above are of great importance and the Department of Agriculture is properly called upon to render them. They can only be discharged by officers of wide experience and in consequence they make considerable demands upon the time of the Director and Deputy Director. Inadequately as the Department is staffed these duties have been carried out not without difficulty, and interference with its ordinary functions.

Labour.—The following comparative table of the average number of units of native labour employed monthly on European farms shews a decrease of 8,566 labourers (men, women and children) for the year ended June, 1925.

Year.			Men	Women	Children	Total
1919-20	...	...	45,005	3,917	4,787	53,709
1920-21	...	...	55,939	4,911	6,539	67,388
1921-22	...	...	51,753	4,261	5,935	61,649
1922-23	...	...	54,406	6,609	9,942	70,957
1923-24	...	...	66,993	8,316	11,784	87,093
1924-25	...	...	61,735	5,477	11,315	78,527

The difficulties experienced and complaints made, particularly in 1924-25, in respect of labour supply are reflected in the above statement. There has probably been an increase in the number of units of labour employed on railway construction work and on activities other than agricultural. The shortage of labour has without doubt retarded progress and development and has also affected crop yields. The rate of wages paid has steadily increased but that does not appear at present to increase the supply nor to improve the output of work. Perhaps the most unsatisfactory feature of the ordinary labourer is his low capacity. This state of affairs is not without one advantage in that it has caused employers to consider and adopt labour-saving devices and to organise their labour more efficiently.

Land Settlement.—The number of European holdings occupied increased from 1618 in 1924 to 1695, in 1925, or an increase of approximately 5 per cent. In some instances two or more contiguous, holdings, under the same management, are returned as one holding for Census purposes.

There is a small but steady influx of new settlers each year. In some cases they have acquired properties already in occupation. Land values have risen due to its proved productive capacity and to the high prices which have ruled for agricultural produce.

Agricultural Shows.—In addition to the Native Agricultural Shows already mentioned, two successful Shows were held under the auspices of the Agricultural & Horticultural Society, one at Nairobi, and the other at Eldoret, the latter being the first held since 1914. In both cases they took place on new Showgrounds. At Nairobi the Society spent no less than nearly £5,000 on the Showground and buildings, and for similar purposes at Eldoret the expenditure amounted to £1,200. Towards the cost of buildings and improvements of a permanent character Government contributes by a Grant-in-Aid of £500 per annum. The diversified character of the exhibits of agricultural produce of good quality displayed at these Shows furnishes proof of the Colony's potentialities. At each Show an exhibit indicative of the Department's activities was staged. Considerable interest was taken in its educational features, by the public.

BRITISH EMPIRE EXHIBITION (1925)

As for the 1924 Exhibition, so for its continuation in 1925, most of the Executive work for the Kenya section was undertaken through the Office of the Department. It is pleasing to record that the high reputation which the Kenya display enjoyed at Wembley in 1924 was well sustained in 1925. The total expenditure for the two years' effort amounted to £17,100. There was returned in Revenue from Grants, public subscriptions, sales, &c., £4,448. The nett cost to the Government was therefore £12,652, but if the contribution of £2000 from the the Railway Department be not included then the nett cost to the Colony amounted to £14,651. There is evidence that great benefits in settlement, trade connections, and a better understanding of the Colony's aims as well as its production have resulted from Kenya's participation in that galaxy of Empire at Wembley.

Towards the establishment of the Trade and Information Bureau for East Africa the work done at Wembley, the exhibits and literature available therefrom and the information collected should prove to be of great value.

East African Stud Book.—Volume III is in the Press and will comprise the following number of entries.

Horses	...	...	...	33
Cattle	...	...	...	291
Sheep	...	...	...	15
Pigs	...	...	...	21

In years to come the value of these authentic records will be appreciated. The initial difficulties, particularly in compiling Volume I, have been overcome, and it is desired to record the painstaking work performed by the Editor.

LIBRARY AND PUBLICATIONS.

The following Reports, Bulletins, etc., prepared by the Officers of the Department have been published during the year:—

Annual Report of the Department of Agriculture for 1924.
Sixth Agricultural Census Report for the year ended 30th June, 1925.

Meteorological Report for 1924.

Report of Proceedings of the Third Maize Conference, 1925.

Grading of Maize Rules, (1925.).

Diseases of Plants Prevention Regulations, 1924.

Coffee Industry of Kenya Colony ; by A. D. le Poer Trench,
Senior Coffee Officer. (Bulletin No. 1 of 1925).

Wheat Growing in Kenya Colony ; by G. J. L. Burton, M.C.,
B.A., Plant Breeder. (Bulletin No. 2 of 1925).

Fungoid Diseases of Coffee in Kenya Colony ; by
J. McDonald, D.F.C., B.Sc., Mycologist.
(Bulletin No. 3 of 1925).

Diseases of Maize and Notes on a Parasitic Maize Weed in
Kenya ; by J. McDonald, D.F.C., B.Sc.,
Mycologist, (Bulletin No. 4 of 1925).

* Coffee Berry Disease ; hints from Department of Agriculture,
latest investigations. (East African Standard " reprint).

Coffee Mealybug—Identification of serious Plant Pest.
(“East African Standard”—reprint).

Coffee Mealybug—Progress Report ; suggestions regarding
methods of control. (“East African Standard”
reprint).

Use of Sesbania Shade.

Directions for the use of Anti-Rinderpest Serum. (Division
of Veterinary Research Bulletin).

Directions for the use of Colon Bacillosis Vaccine. (Division
of Veterinary Research Bulletin).

Directions for the use of double Anthrax Vaccine. (Division
of Veterinary Research Bulletin).

Directions for the use of double Blackwater Vaccine.
(Division of Veterinary Research Bulletin).

Directions for the use of Kikuyu Fowl Disease Vaccine.
(Division of Veterinary Research Bulletin).

Directions for the use of Trypanblue. (Division of
Veterinary Research Bulletin).

Directions for the use of Wireworm Remedy.

(Division of Veterinary Research Bulletin).

Directions for the use of Pleuro-pneumona (pure culture)
Vaccine. (Division of Veterinary Research.
Bulletin).



Sugar Cane (U'ba) at Miwani.

DEPARTMENTAL REPORTS.

Submitted with this Report are included the following appendices :—

- (a) Staff Changes and New Appointments in 1925.
- (b) Staff at December 31st, 1925.
- (c) Annual Report of the Chief Veterinary Officer.
- (d) Annual Report of the Chief Veterinary Research Officer.
- (e) Annual Report of the Agricultural Chemist.
- (f) Annual Report of the Entomologist.
- (g) Annual Report of the Mycologist.
- (h) Annual Report of the Plant Breeder.
- (i) Annual Report of the Senior Coffee Officer.
- (j) Annual Report of the Flax Officer.
- (k) Annual Report of the Grader & Inspector.
- (l) Annual Report of the Agricultural Supervisor, Scott Agricultural Laboratories.
- (m) Annual Report of the Senior Agricultural Supervisor, Coast.
- (n) Annual Report of the Senior Agricultural Supervisor Kisumu.
- (o) Summary of Meteorological Records for 1925.
- (p) Schedule showing Agricultural Exports for 1925 and previous years.

In concluding this report it is desired again to acknowledge and pay a tribute to the staff, including all sections, for the interest they have taken in their work and the devotion to their duties. The volume of work transacted cannot be indicated fully, but this review, together with the sectional reports of the Chief Officers, will, it is hoped, show that the Department has rendered services of considerable value to the community and is ever mindful of the needs of the agricultural industry.

NAIROBI :

April, 1926.

(Sgd.) ALEX HOLM,

Director of Agriculture.

APPENDIX "A."

STAFF.

The principal staff changes and new appointments during the year under review were :—

Mr. T. W. Kirkpatrick (Entomologist) arrived on first appointment on 25th June, 1925.

Mr. J. Lewison (Clerk) appointed locally 1st July, 1925.

Mr. E. G. Hargreaves (Junior Clerk) appointed locally 1st October 1925.

Mr. D. F. Sargent (Foreman Mechanic) appointed 11th June, 1925.

Mr. F. P. Rhys Maitland (Junior Clerk) transferred to Treasury 1st December, 1925.

Mr. T. M. W. Sheppard (Agricultural Supervisor) left the service on 1st September, 1925.

Mr. A. R. Teague (Grader & Inspector) resigned on 16th August, 1925.

2. VETERINARY ADMINISTRATIVE & EXECUTIVE DIVISION.

Mr. F. R. H. Shaw, Stock Inspector, left the Service, 18th November, 1925.

The following Officers were appointed :—

Mr. J. Denwett, Stock Inspector, 16th June, 1925.

Mr. C. P. Glover, Stock Inspector, 7th January, 1925.

Mr. A. Lambie, Stock Inspector, 12th March, 1925.

Mr. J. G. Carter, Stock Inspector, 19th November, 1925.

3. DIVISION OF VETERINARY RESEARCH.

Mr. J. Sim was appointed Temporary Farm Overseer on 24th August, 1925.

Mr. R. Daubney, M.R.C.V.S., M.Sc., Assistant Chief Veterinary Research Officer, arrived on first appointment on 10th July, 1925.

Mr. E. J. Hall, Laboratory Assistant, arrived on first appointment on 12th June, 1925.

Mr. W. P. Bruce, Laboratory Assistant, arrived on first appointment on 10th December, 1925.

APPENDIX "B".

STAFF LIST

OF

DEPARTMENT OF AGRICULTURE.

(AS AT DECEMBER 31st, 1925.)

Director :

Alex Holm, C.B.E., F.H.A.S., M.R.A.S.E., S.E.A.C., (Dip. Hons).

Deputy Director :

E. Harrison, M.S.A., B.Sc., N.D.A. (Hons).

Administrative and General :—

Statistical Officer : L. D. Carpenter, P.A.S.I.

Accountant:—H. S. Land.

Office Superintendent & Asst. Accountant:—A. C. Hunter.

Clerks: R. Abram, R. F. Dalziel-Armstrong, J. E. Harrison,
R. A. Hawkins, F. Parker, L. Myers.

Junior Clerks : F. W. Evans, F. E. K. Barratt (Miss), B. F.
Ratcliffe, K. Rhys Maitland.
B. A. Pickering, R. N. Noble.
E. G. Hargreaves.

Lady Typist : Mrs. M. A. Carr-Hole.

Entomologist: T. J. Anderson, M.A., B. Sc., (Hons. Edin.), F.Z.S.
F.E.S.

Assistant Entomologist : T. W. Kirkpatrick, B.A. F.E.S.

Mycologist : J. McDonald, D.F.C., B.Sc., (Hons). F.L.S.

Agricultural Chemist: V. A. Beckley, B.A.

Chemical Officer : M. H. Fox, B.Sc., A.I.C.

Plant Breeder : G. J. L. Burton, M.C., B.A.

Senior Coffee Officer: A. D. Le Poer Trench (Dip. O.A.C.)

Inspector of Plantations : H. Wilkinson, A.R.C.Sc., F.E.S.

Flax Officer : G. M. Hamilton.

Graders and Inspectors : C. C. T. Sharp, F. B. L. Butler, F.L.S.
F.R.H.S.

Foreman Mechanic: D. F. Sargent.

Senior Agricultural Supervisors : P. Booth, N.D.A., U.D.A. R. J.
Lathbury, M.A., A. G. Bailey, B.A.

Agricultural Supervisors : B. H. Frowde, A. S. Hartley, W.
Lyne Watt, N. D. Spranger.

VETERINARY.

1. ADMINISTRATIVE & EXECUTIVE DIVISION.

Chief Veterinary Officer : A. G. Doherty, M.C., M.R.C.V.S.

Ag. Deputy Chief Veterinary Officer : H. H. Brassey Edwards,
M.R.C.V.S.

Senior Veterinary Officers : O. Dixon M.C., M.R.C.V.S., R. C.
Wheeler, M.B.E., M.R.C.V.S.

Veterinary Officers : A. W. Carter, M.R.C.V.S., M. H. Reid,
M.R.C.V.S., G. B. Purvis, M.R.C.V.S., R. S.
Little, M.R.C.V.S., D.V.S.M., R. L. Creery,
M.R.C.V.S., W. G. Emerson, M.R.C.V.S.,
E. J. Mulligan, M.R.C.V.S., E. A. Wilshaw,
M.R.C.V.S.

Stock Inspectors : H. G. Ulyate, D. Wyartt, R. A. C. Campbell,
W. L. Lewis, G. White, H. E. Evans, J.
Mackay, L. E. Smith, F. G. Chapman, F. T.
O'Meagher, H. Thorne, S. F. Saunders, T.
Harris, J. F. Greig, A. E. Hudson, J. E.
McDonogh, C. B. Jolley, P. H. Poolman,
H. J. Vernop, C. P. Glover, J. Denwett,
A. Lambie, J. G. Carter.

2. DIVISION OF VETERINARY RESEARCH.

Chief Veterinary Research Officer J. Walker, M.R.C.V.S.

Assistant Chief Veterinary Research Officer : R. Daubney,
M.R.C.V.S. M.Sc.

Veterinary Research Officer, S. H. Whitworth, M.R.C.V.S., B.V.S.
(Melb.), D.V.M. (Zurich).

Veterinary Research Officer:—Vacant.

Laboratory Superintendent : A. Walker.

Laboratory Assistants : J. T. Schultz, H. J. Gray, J. R. McQueen,
J. S. McDonald, E. J. Hall, W. P. Bruce.

Overseer : J. Burton.

Yard Foreman : J. Forsyth.

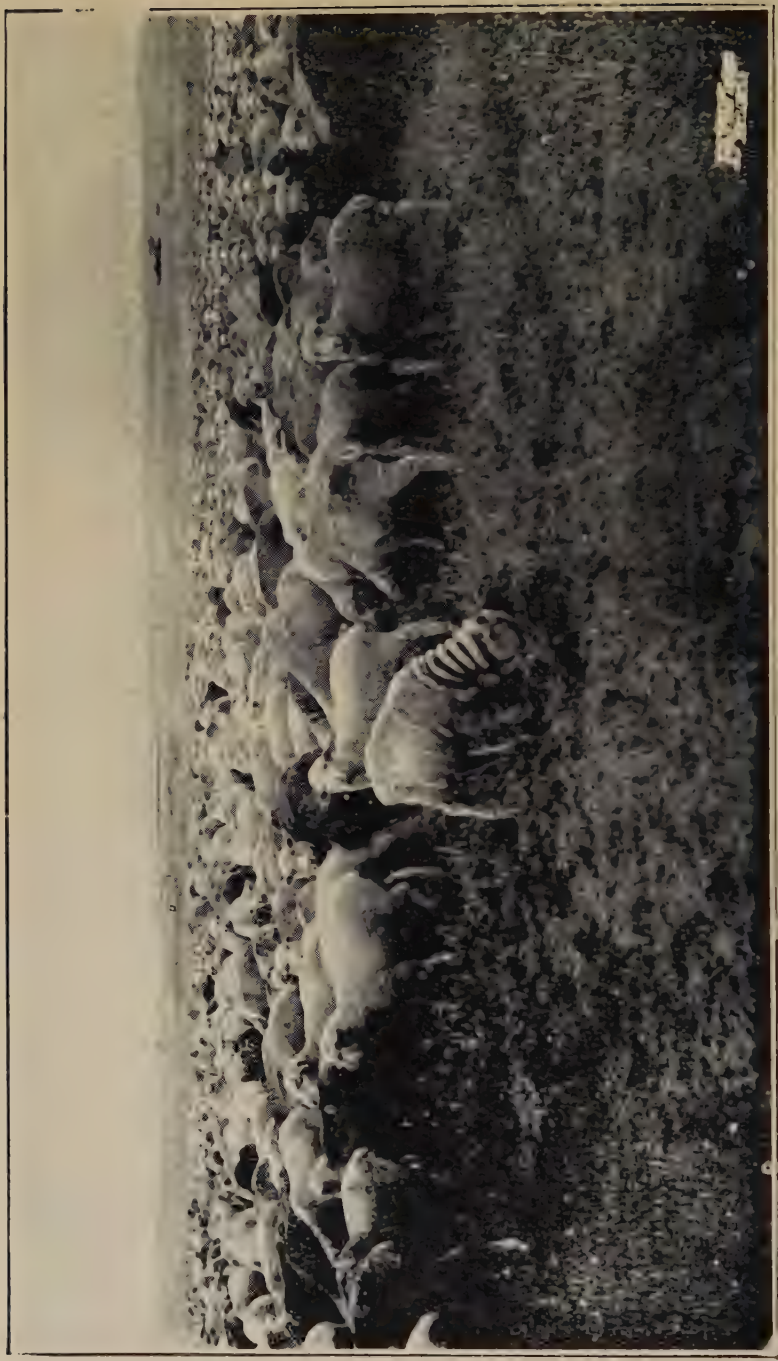
Clerks : W. White, A. E. Johnstone, A. J. Kemp.

Mechanic : O. Stenmark.

Storekeeper : J. Scott.

Assistant Storekeeper : G. W. Clochley.

Junior Clerk : Miss N. Judd.



A Flock of Grade Merino Sheep.

APPENDIX "C."

REPORT

OF

CHIEF VETERINARY OFFICER.

STAFF CHANGES.

Lieut: Colonel A. G. Doherty, M.C., was appointed Chief Veterinary Officer on the 21st August, 1925, with effect from the 10th of September, 1924, and was on duty throughout the year.

Major H. H. Brassey Edwards returned from leave during the month of February and performed the duties of Acting Deputy Chief Veterinary Officer during the remainder of the year.

Captain O. Dixon, M.C., carried out the duties of Acting Deputy Chief Veterinary Officer until Major H. H. Brassey Edwards returned from leave.

The undermentioned Officers returned from leave during the period under review :—Major H. H. Brassey Edwards, on 1st February 1925. Mr J. T. C. Bradshaw, Veterinary Officer, on 22nd February, 1925. Mr. W. G. Emerson, Veterinary Officer, on 28th March 1925. Mr. D. Wyartt, Stock Inspector, on 28th March, 1925. Mr. G. White, Stock Inspector, on 10th July 1925, Mr. L. E. Smith, Stock Inspector, on 5th November 1925. Mr. A. E. Hudson, Stock Inspector, on 1st February 1925.

The undermentioned Officers proceeded on leave during the year under review :—Captain O. Dixon, M.C., Senior Veterinary Officer, on 13th June 1925. Mr. E. J. Mulligan, Veterinary Officer, on 1st April, 1925. Mr. H. G. Ulyate, Stock Inspector, on 5th December, 1925. Mr. R. A. C. Campbell, Stock Inspector, on 3rd October, 1925. Mr. W. L. Lewis, Stock Inspector, on 10th October, 1925. Mr. H. E. Evans, Stock Inspector, on 21st April, 1925. Mr. J. E. McDonogh, Stock Inspector, on 15th May, 1925.

GENERAL.

The Veterinary Department is composed of two Divisions under the Director of Agriculture. The Field Service or the "Administrative and Executive Division" and the Laboratory Service or "Division of Veterinary Research." The Chief Veterinary Officer is in charge of the former, and the Chief Veterinary Research Officer of the latter Division.

The post of Chief Veterinary Officer which was vacant from the 21st of August, 1924, when Major Kennedy left the Service of the Colony on transfer to the Soudan, was filled on the 10th of September, 1925, by the present holder who had been officiating in an acting capacity since Major Kennedy's departure.

The post of Deputy Chief Veterinary Officer remained unfilled during the year and up to the time of writing this report, (April 1926), no appointment has been made. Major H. H. Brassey Edwards, Senior Veterinary Officer, continues to perform the duties of the post in an acting capacity.

The staff of the "Administrative and Executive Division" consisted of eleven qualified Veterinary Officers and nineteen Lay members, Stock Inspectors, during the year. An extra Stock Inspector in addition to the number stated was appointed in July to assist in dealing with cattle disease in the Kerio Province,

A perusal of this report, which details the work of the Veterinary staff, will give some idea of the increased work and responsibility devolving on the Veterinary organisation at Headquarters.

The year under review has been a most strenuous one for my staff who have immunised by the simultaneous method (double inoculation) 185,888 head of cattle. When it is considered that these inoculations, of an admittedly difficult nature, were performed under field conditions, without facilities for shelter or hand-feeding the serious cases reacting to the inoculation, with a mortality of only 2.2% of all cattle inoculated, including herds already affected with rinderpest, some appreciation of the work performed by the staff employed can be formed. The numbers quoted show a steady advance along the lines laid down for this work in 1924 when 59,149 head were similarly inoculated.

The success of this system is largely due to the Officers and Stock Inspectors of the service who have spared no effort to overcome all the disabilities that are inevitable in the initial stages of such work amongst primitive natives.

Some of the difficulties can be realised when it is, remembered that all the station buildings, yards and crushes were erected by the staff themselves. In the absence of reliable information to form opinions as to the permanency of the work, buildings could not be asked for on a suitable scale.

Meticulous care in the technique of the inoculations is essential to avoid mishaps. Suspicious native owners have to be patiently listened to and explanations repeated daily and even hourly. Susceptible cattle to be used as virus makers arranged for and carefully examined to eliminate other infections such as Anthrax or trypanosomes. The ever present necessity of arranging for an exchange to convert the native currency (cattle) to cash for inoculation fees. The controlling of reactions; testing for immunity; branding and recognition of individual owners' stock when thousands of cattle are handled or are under observation daily. Evenings devoted to filling up returns and reports for Headquarters, including financial statements to be examined and passed by the Treasury and Audit Officers. These represent a few of the duties in the daily routine of rinderpest inoculations.

The conferring of a life immunity to rinderpest on 185,888 head of cattle with a mortality of 2.2% represents a dead loss of 3,716 head. The method by which native herds have hitherto obtained this life protection has been a natural attack of the disease which most observers estimate causes a loss of 50% to 60%, the survivors possessing a life immunity. Putting the mortality from this method at the lower figure of 50% nature's method represents a dead loss of 92,944 head of cattle as against 3,716 by the inoculation method which gives the same immunity with a saving of 89,228 head to the owners.

The financial aspect of the protection afforded by Government against rinderpest as shown by the work performed during the period under review is even more striking than the mortality returns indicate.

A financial statement as follows can represent the result of the year's work on anti-rinderpest measures by the Veterinary Department.

For purposes of the statement an estimate of £1.10 per head is given as average for all classes of stock inoculated: the majority of native stock now being presented are young animals.

Immunity naturally acquired :—

	£
185,888 head of cattle at £1.10 per head ...	288,832
50% mortality = 92,944 head at £1.10 per head	144,416
Cost of the immunity to owners ...	<u>144,416</u>

Immunity by inoculation :—

2·2% mortality of 185,888 head =	3,716	
head of cattle at £1·10 per head	...	£5,574
Inoculation fees at 2/50 per head	...	23,222
Cost of the immunity to owners	...	28,796
Saving to owners by the inoculation method	...	115,620

The percentage of immunity existing amongst the stock inoculated is difficult to estimate. It is known to be practically nil at the Veterinary Stations where Native owners present only susceptible stock for double inoculation. If 25% is allowed for immune animals in the number treated the mortality rate would be 2·6% for the susceptible stock.

The revenue from the Veterinary Field Staff for the last three years is given for purposes of comparison :—

1923.	1924.	1925.
£ 6,119	£ 11,536	£ 24,520

The increase is entirely due to the adoption by natives of the immunisation method against rinderpest offered to them by Government on payment. As shown above the saving to cattle owners by using the method is very great and the State benefits by an increasing revenue.

The distances travelled by the members of the Field Staff increased during the year, owing to the larger demands for Veterinary Services.

The average mileage for the Field Staff was 273·6 miles per month.

The position of the Colony in respect of the various diseases of economic importance is set out as far as possible under the separate headings.

MOMBASA & COAST AREA.

As in past years a Veterinary Assistant was stationed at Mombasa during the year for inspection duty in connection with animals arriving from oversea. His duties also include inspection of the Coastwise animal traffic by sea and land.

The following stock arrived from oversea and was sailed to up-country destinations :—

Horses	...	34	Sheep and Goats	...	213
Mules	...	2	Pigs	...	20
Cattle	...	164	Poultry	...	240
Dogs	...	100	Cats	...	8

The Coastwise traffic landed on the Island represented :—

Horses	...	...	2	Cattle	...	...	751
Mules	...	...	4	Camels	...	...	54
Donkeys	...	...	47	Sheep & Goats	...	...	4,726
Pigs	...	...	12				

The following stock arrived at Mombasa by rail from up-country stations :—

Cattle	...	739
Sheep	...	100

The Veterinary Station at Makupa dealt with the following numbers of stock arriving by road from the Mainland :—

Cattle	...	2,821	Donkeys	...	10
Sheep & Goats	...	9,247	Pigs	...	29

Inspection of Hides and Skins for export :—

14,293 bundles of Hides ;
2,486 bundles of Skins.

were inspected.

Inspection of Slaughter Stock :—

5,337 Cattle.
18,598 Sheep & Goats

were slaughtered for human consumption on Mombasa Island during the year.

The numbers condemned were :—

Cattle	...	265
Sheep & Goats	...	Portions of carcasses, weighing 5,410 lbs.

Dairy Cattle on Mombasa Island :—

Approximately 1,000 head of dairy cattle are maintained for the local milk supply. They are mainly grade cows purchased in the Highlands.

There were 37 deaths from East Coast Fever on the Island during the year.

I obtained sanction for an additional Veterinary Assistant who will be posted to the Coast for duty during 1926. Arrangements are in progress for the establishment of a Veterinary Station at Mariakani which is centrally situated with roads running North and South. This Station is intended to serve the cattle owning people of the Coast, and the Coast Veterinary work will be in charge of Mr. S. G. Hassan, an experienced Senior Veterinary Assistant.

RINDERPEST.

The year 1925 marked a notable step forward in respect of our position with regard to rinderpest. It is now generally accepted that active immunisation by the simultaneous injection of virulent rinderpest blood and a protective dose of anti-rinderpest serum (double inoculation) which confers an immunity now regarded as life-long, is the method best suited to Kenya conditions.

My endeavours throughout the year have been directed towards improvement in the technique of this work.

The most important point in this connection was the elucidation of the cause of animals failing to react at the time of inoculation, remaining susceptible, and subsequently contracting the disease naturally. I investigated this matter in conjunction with field Veterinary Officers carrying out inoculations and the Chief Veterinary Research Officer carried out experiments which are detailed in his Annual Report.

In order to have full discussion on this and other problems, I arranged for a Conference of all field Veterinary Officers which was held at Nairobi in July, at which the Chief Veterinary Research Officer and the Research Officers attended.

This Conference was most helpful and enabled me to issue instructions which have effected an increased measure of safety in regard to double inoculations.

The manner in which double inoculations against rinderpest are organised must be governed by local conditions, if mortality is to be kept normal. In the past it was customary to submit all classes of susceptible stock in a district to the process irrespective of age or condition, provided conditions generally suited the greater number. This procedure was indicated under the conditions then existing, and although accepted by owners as better than the ever present risk of natural infection, the rate of mortality was sometimes high. District Centres for double inoculation admit of the immunisation of stock under suitable conditions, and obviate the necessity of risking unthrifty weaners and in-calf cows. Such centres are a great boon to dairying districts where the interference with the milk yield from susceptible cows would be a serious matter.

I will discuss the work of the Rinderpest Service which carries out these inoculations, when dealing with Native Education under which heading I deal with Rinderpest in the Reserves.

The following is a brief summary of this disease as it affected the settled areas during the year.

The Districts mentioned are Veterinary districts:—

NAIROBI DISTRICT:

There were thirteen outbreaks, all of which occurred amongst squatter cattle on farms on either side of the Nairobi - Fort Hall Road. 4992 head of cattle were double inoculated.

UASIN GISHU & TRANS NZOIA DISTRICTS:

Eighty-five outbreaks in the Uasin Gishu and thirty in the Trans Nzoia District were reported during the year. Most of these occurred in the first half of the year.

In dealing with these outbreaks the District Staff carried out 16,354 double inoculations, 1201 head were inoculated with serum alone and 518 head were tested for immunity. The total mortality approximated 3% which is satisfactory and much below the average when dealing with infected stock. Only ten outbreaks were reported in these areas after June, and there were no outbreaks recorded in November and December.

The Rinderpest Service took over the work of rinderpest inoculations in the Uasin Gishu District in August. Inoculations were arranged in the Sergoit, Broederstom and Farm 40 Districts. The number of cattle inoculated by the Rinderpest Service was 15370.

NORTH NYERI & LAIKIPIA DISTRICTS.

There were no outbreaks reported in these areas during the year.

7,222 head of cattle were double inoculated in the Laikipia District. The mortality was approximately 2%.

NAKURU DISTRICT.

Nine outbreaks were reported during the year. 7,613 head of cattle were double inoculated with a mortality of 3.5%.

An inoculation centre was established at Gilgil towards the end of the year for the convenience of farmers in that area. Arrangements were made for the double inoculation of 1921 grade cattle. Owing to inclement weather these inoculations had to be postponed. They were carried out successfully in January this year with a mortality of 16 head from all causes, which was most satisfactory.

LUMBWA DISTRICT.

There were 12 outbreaks reported during the year. 4,759 head of cattle were double inoculated. The mortality from inoculations was satisfactory, but the difficulty in obtaining complete returns from the squatter owners makes it difficult to state a figure.

 TRYPANOSOMIASIS.

I will discuss the position with regard to this disease under three heads :

1. Cases of the disease in areas where Tsetse Fly exist and can be captured.
2. Cases in areas adjacent to known Tsetse Fly areas, but where Tsetse Fly have not been captured.
3. Cases in areas far removed from any known Tsetse Fly area and where Tsetse have never been captured.

1. Cases under this category were reported but none indicated extensions of known Fly belts.

2. Owners of a few recently developed farms adjacent to known Tsetse Fly belts have reported cases of Trypanosomiasis in their stock. Search on the farms themselves have resulted in failure to find Tsetse, but Tsetse were caught a few miles distant in a known Tsetse Fly belt inhabited by large herds of buffalo and elephant which are known to use the farm areas as grazing grounds. The fact that the Tsetse Fly has not been demonstrated on the farm lands has given rise to discussion on the transmission of trypanosomes from the blood of infected animals to the non-infected by agents other than the Tsetse Fly. In my experience based on twenty years association with Tsetse Fly and trypanosome infections on fly free grazing areas situated in close proximity to known Tsetse belts, subject to the migration of big game, especially elephant and buffalo, I have been able definitely to associate cases of trypanosomiasis with the visits of these large game animals to the grazing grounds of domesticated live stock. I am of the opinion that while it is possible to effect transmission by biting flies other than Tsetse, such infection is accidental and has never amounted to an epidemic. The cases falling under this category, therefore, should be attributed to the very temporary presence of a few Tsetse flies accompanying the large game animals while they are using the farm pastures, or farm stock grazing in the fly area.

3. Seven outbreaks falling under this head were reported during the year. They were amongst cattle brought from a known Tsetse Fly infested area. The staff at my disposal in the districts where the outbreaks occurred did not admit of close continued observation. The usual course was adopted, *i. e.* the imposition of quarantine until all the cases of trypanosomiasis had died or were destroyed. The disease did not extend to cattle other than those originally infected, although the numbers involved were approximately 2,500 head of which approximately 200 died or were slaughtered before the quarantines were raised. Since then no further cases have been reported. This has been the usual experience in Kenya over many hundred instances of cases of this disease being brought from Tsetse Fly belts to farms where they die, or are destroyed without any extension of the disease to other animals in close contact.

EDUCATION OF NATIVES.

The value of scientific work in connection with stock and stock diseases is governed by the ability of Government to apply the knowledge gained to the flocks and herds of the Colony.

The conservatism of our primitive pastoral peoples and their blind adherence to the cattle husbandry of their forefathers, which has handed down to them all the stock they possess, can easily be understood by any student of the African Native. This inherited cattle husbandry has for its keystone immunity to disease naturally acquired. The price paid for this immunity (acquired at an expense of approximately 60 per cent mortality of infected stock) is a heavy one, but the native understands it. In my last Annual Report I reported on the first stage of an educational system I had introduced with the object of demonstrating to natives a cheaper method of obtaining immunity to rinderpest.

The system consists of two organisations :

1. Inoculating Stations in the Reserves.
2. An inoculating service in the settled areas in conjunction with a training school.

1. Reserve Stations established in the first instance to deal with trade stock which afforded the material for the demonstrations to the local natives were operating at the following centres during the year: Bungoma, situated in Chief Sudi's location North Kavirondo; Kingwall, situated in the Nandi Reserve on the main Kapsabet—Eldoret Road; Timboroa, situated on the main Eldama Ravine—Eldoret road and serving the Kamasia, Elgeyo, and Marakwet Reserves; Machakos, serving the central and southern portion of the Akamba Reserve; Waterfalls, serving the Northern portion of the Akamba Reserve; and the Yatta Plains; Kibigori, serving Central Kavirondo. The station at Isiolo was closed for the reception of cattle during the year, but dealt with large numbers of sheep and goats as well as the usual horse and mule trade from Abyssinia. The stations at Kipkarren, Sergoit, Kamiti and Thika were closed during the year.

Nandi Reserve.—The Station at Kingwall was opened during the year in response to requests from the natives who had been observing the work in the adjoining Reserve where an inoculation station is in operation at Chief Sudi's location in North Kavirondo.

The Kingwall station was opened in October with Stock Inspector White in charge, who manages the station under the direction of Mr. Bradshaw, the Veterinary Officer at Eldoret, which is twenty miles distant on a good road.

The Nandi have taken a most intelligent interest in the work of immunisation against rinderpest. By the end of the year, in addition to 418 head of trade stock, the natives had brought 8,357 of their own stock to the station for inoculation.

Kerio Province.—An inoculating station was established at Timboroa in July to serve the Kamasia and Elgeyo Natives. The station was under the direction of Captain Wheeler, Senior Veterinary Officer at Nakuru, with Stock Inspector Thorne in charge. It was subsequently found more convenient to place the station in the Eldoret Veterinary District, and it is now controlled by the Veterinary Officer there.

This station has been of great service to the natives in lessening mortality from rinderpest. By the end of the year, in addition to 1,266 head of cattle the property of traders, the natives had brought 10,793 head of their own stock to the station for inoculation.

Owing to the prevalence of rinderpest amongst Buffalo in the Kerio Valley and active rinderpest in the Marakwet Native Reserve, a temporary inoculation centre was established at Kamorin by request of the Native Administration who had

been approached by the natives of the Reserve to obtain protection by inoculation against rinderpest. It is of interest to record that the request from these native stock owners was accompanied by a statement that they had seen farms on the borders of their Reserve receive this protection and they wished for the same treatment.

8,290 head of cattle were inoculated from the centre at Kamorin.

NORTH KAVIRONDO :—

The Veterinary station at Bungoma, which was established in December, 1924, was in charge of Stock Inspector Saunders during the year and continued to deal successfully with the large numbers of cattle presented by the Natives for inoculation. 4,437 inoculations were carried out in respect of trade stock, and 54,850 inoculations were carried out on stock brought to the station by native owners.

MACHAKOS AKAMBA :—

This tribe was served by two stations during the year.

(a) *Waterfalls Station.* This station was open throughout the year and carried out 81,844 double inoculations against rinderpest on cattle brought to the station by native owners, a very healthy sign that they appreciate the value of this immunity by inoculation. 3,883 head of trade stock were dealt with.

(b) *Machakos Station.* Owing to drought conditions it was not possible to keep this station open very long during the year. 4,309 inoculations were carried out during the short period when conditions were suitable of which 1,302 head were trade cattle, making a total of 5,185 head of cattle sold and passed through Veterinary Stations during the year from the Machakos Akamba Reserve.

The Veterinary work of the Reserve is under the direction of Captain Scott Little, Veterinary Officer, and the Waterfalls and Machakos stations are in charge of Stock Inspector J. Greig and C. P. Glover, respectively.

A comprehensive survey of the stock of the Machakos Reserve was carried out during the year by the Veterinary Officer in charge, the result of which has been communicated to Government.

ISIOLO VETERINARY STATION :—

This station serves the Northern Frontier District and is under the direction of the Veterinary Officer of the North Nyeri and Laikipia districts. It was in charge of Stock Inspector McDonogh during the greater part of the year.

73,282 sheep and goats, 1,614 horses and mules were dealt with at the station during the year.

KIBIGORI VETERINARY STATION :—

The trade in cattle from Central and South Kavirondo was of small dimensions during the greater part of the year. The position improved towards the end of the year and a total of 2,818 head of cattle were dealt with.

The station was used to a certain extent by Natives from Nandi who brought their stock down the escarpment for inoculation. It is noticeable that since the Kingwall station has been opened in the Nandi Reserve this traffic has ceased and Central Kavirondo natives are taking more interest in the work of the station. The stock lifting trait in the Nandi character will take a few generations to live down.

2. The second part of the educational system which supplements the work of the Stations in the Reserves, is a specially organised service dealing solely with the immunisation of stock outside the Reserves. This system provides excellent facilities for a course of instruction of a practical nature under the conditions obtaining in the pastoral districts of the settled areas. Such close contact with improved stock and stock management cannot fail to broaden the mind of the primitive African who will be quick to appreciate that modern methods can give better results than his own primitive ideas of stock husbandry.

Africans trained under this system will be returned to their Reserves under the Veterinary Staff in the native areas. .

There was not time to get this Service established on regular lines during the short time it was operating towards the end of the year, but sufficient work was carried out to demonstrate its usefulness and indicate the methods required for a permanent organisation.

The initial expenditure for the Veterinary Training School for Natives was sanctioned in the 1926 Estimates with a view to its establishment at Ngong where it will be very centrally situated for the work intended in conjunction with the Rinderpest Service.

The effecting of improvements in double inoculations against rinderpest has increased the work of the staff employed, not only in respect of additional supervision and details of technique, but in purely clerical work as a perusal of the forms shown as an appendix to this report indicate. There has been a difficulty in obtaining efficient African Clerks to relieve the Field Staff of this burden of keeping returns up to date. It is most important that the information furnished should not only

be correct, but absolutely up to date for the efficient supervision and control of the work involving the immunisation of thousands of cattle weekly. The average for last year approximated 3,500 per week for the year.

When a District inoculation is asked for a census of stock is taken to know what requirements are necessary in the way of Staff, Laboratory Products, and inoculation centres.

Suitable sites are chosen, the main considerations being a central position, good grazing and water facilities.

All stock sent to these centres are detained until the results of the inoculations are observed, the immunity tested, and branding completed.

Susceptable cattle about two years old drawn from the district are selected and put in a building at the central inoculation centre. Daily temperatures are taken and blood smears examined. These are recorded (vide Form B) and if the virus producers are considered satisfactory one of the animals is inoculated with virulent rinderpest blood. Other controls are placed in contact with the infected animal. The in-contact controls are used as the virus producers provided they react in a normal manner and blood examinations are satisfactory. Blood is used for four hours only after it is drawn from the virus producer.

The blood of the virus producer used for the inoculations is injected into another control to prove the infectivity of the blood.

The inoculations at each centre are carried out by one Stock Inspector and four native inoculators under the direction of the Veterinary Officer in charge of the district inoculations. The duties of the staff will be detailed under the different headings.

INOCULATIONS.

The cattle have been collected and examined (the inoculating staff reserves the right to reject any animal which, in their opinion, is not in a suitable condition). A maximum of 3,000 head is collected at each centre and 1,500 head of stock is the maximum inoculation undertaken in one day. The Veterinary Officer in charge regulates the dose of Anti-rinderpest Serum which is injected by trained inoculators under his direct supervision and the Stock Inspector injects the virulent blood. Before the crushes are filled the cattle are drafted into the yards according to size to admit of easy estimation of individual serum requirements. For purebreds and grades an index of 30 c.c. per hundred kilogrammes is given ; for susceptible native stock and all native two year old stock an index of 20 c.c. ; for native stock drawn from reserves except as otherwise stated an index of 15 c.c. 2 c.c. of virulent blood is inoculated into each animal. Form C attached gives the particulars of the blood and serum returns.

CONTROL OF INOCULATIONS.

At the time of inoculation each animal is suitably hair branded, and in addition 10% are branded numerically. 10% of each mob of stock inoculated are temperatured daily before 8 a.m. for 14 days and recorded on Form A. Symptoms are noted by the Stock Inspector in charge of each centre and any serious reactions are reported to the Veterinary Officer in charge. If the reactions are satisfactory, which is judged by the perusal of temperature charts of the controls, the cattle are branded as immune.

IMMUNITY TEST.

In the event of an unsatisfactory percentage of reactions an immunity test is carried out by the inoculation of a further dose of virulent blood only. It is under consideration as to whether immunity tests should be done as part of all inoculations.

MORTALITY.

It is found that the use of very fresh blood, a correct dosage of serum, and given opportunity to watch and attend stock at an inoculation centre, that the mortality can be negligible. Form D is used for mortality record.

Stock are, as a rule, assembled at a centre several days before the inoculation and are detained for a period of six weeks following inoculations to enable the staff in attendance to attend to any sequelae following the inoculations.

It should be mentioned that special attention is made to have proper crushes and paddocks prepared in order that the cattle may be handled with as little delay and worry to the staff as possible.

FORM A.

CONTROL TEMPERATURE SHEET.

Blood Control No.....
Serum Brew No.....

Place.....Date.....
OWNERS.....

Type of Animal Number.	DAYS.														RESULTS.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	

VIRUS MAKERS.

FORM B.
Number.....Date of inoculation of V. B.....
Type of Animal.....From Virus Maker No.....
From where purchased.....Date of inoculation of V. B.....
Died or.....Into Virus Maker No.....
Sold.....
Before inoculation.

TEMPERATURE RECORD.

														RESULT.						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

After inoculation.

After inoculation.							RESULTS.	
1	2	3	4	5	6	7		
					</			

Bled on.....No. of Bottles.....
Bled on.....No. of Bottles.....
Bled on.....No. of Bottles.....
Signed.....

BLOOD AND SERUM RETURN.

[illegible]

Total Number of Cattle inoculated.....	100
Total amount of serum used.....	100
Average per head.....	1

Signed.....

MORTALITY RECORD.

[illegible]

SLAUGHTER CATTLE.

At Nairobi cattle were required in increasing numbers throughout the year to satisfy the demands of the local meat trade.

There are two sources of supply. Small numbers were available from farms in the settled areas; the main supply was drawn from the Masai Reserve.

The numbers returned from the abattoirs as slaughtered in 1924 was 11,085; 1925 figures show 13,331 or an increase of 2,246 over the previous year. This increase in number did not, however, yield a proportionate increase in meat for sale to the public in respect of the supplies of cattle from the Native Reserves owing to decrease in the size and quality of the Native Reserve animals slaughtered.

The following details of slaughter cattle derived from Native sources are of interest :

188 Masai cattle purchased for slaughter were examined for age with the following results :—2 years and under, 130 ; 4 years old, 91 ; 5 years old, 29 ; 3 years old, 17 ; very old 38.

The following figures are supplied from Nairobi abattoir : 30 dressed carcasses. Masai bullocks ; heaviest 272 lbs ; lightest 136 lbs ; average 196 lbs. Ages are not given, but the carcasses were chosen at random. Five carcasses of Boran bullocks weighed 684 lbs, 596 lbs, 482 lbs, 554 lbs, 398 lbs. respectively. The Boran bullocks had been "finished" in the settled areas.

A study of these figures is recommended to anyone interested in the supply of slaughter cattle. The further the subject is pursued the more evident it is that the present supplies from Native sources direct to the abattoir are not only of inferior quality but wasteful. Native Reserves have a plentiful supply of immature oxen which would return their full value to native owners at 18 months old and provide good supplies of meat at an early age if "finished" under suitable conditions, whereas they are not an economic proposition to the native kept after that age, besides crowding pastures to the detriment of breeding stock.

There is evidence that the local consumption of meat has increased beyond the normal flow of suitable slaughter cattle.

An organised trade and industry on the lines indicated above would ensure adequate supplies of nutritious meat for the public to replace the present unsatisfactory supply direct from the Reserves.

HIDES & SKINS.

It is estimated that approximately 900,000 hides and about 830,000 sheep and goat skins were shipped from Mombasa during the year. The quality of these hides and skins is capable of improvement by the use of better methods of flaying and drying. In the large towns this is attended to by the representatives of the Trade who are able to secure a constant flow of green hides from abattoirs. In the Native Reserves, where the main supply of hides and skins are obtained, there are few centres where green hides can be obtained in sufficient numbers to warrant the expense of a resident instructor. At certain markets in Kavirondo cattle are slaughtered for food and at times in large numbers. Use has been made of such opportunities for instruction in flaying and for the erection of suitable drying sheds. The acceptance of the better prepared hides from natives at enhanced prices by the Agents of the Trade has the effect of stimulating the adoption of better methods.

One of my staff of Stock Inspectors is at present receiving instruction in England on the subject of hides and skins and their preparation for market.

TUBERCULOSIS.

Pulmonary Tuberculosis has been reported from Nairobi Abattoir. The cases were amongst cattle from the Masai Reserve.

SHEEP DISEASES.

Sheep scab and internal parasites continue to be the chief source of economic loss to the sheep industry.

Dipping under careful supervision and regular dosing with the wireworm remedy, sold to farmers from the Veterinary Laboratory, provide efficient control for both these conditions.

Investigation into a pneumonic affection in lambs was carried out during the year, and is reported on in the Chief Veterinary Research Officer's report.

EAST COAST FEVER :—

There were three centres of infection of this disease reported in the areas of Mau Summit and Molo, nine in North Nyeri and Laikipia areas, and one in the Limuru area, during the year. At the time of writing (April 1926) the number of centres in Mau and Molo is increased to nine and the number in North Nyeri and Laikipia areas is thirty six. The diagnosis of these fresh centres was confirmed by microscopical examination of infected material,

With the exception of the above reported outbreaks the position of the Colony in respect of East Coast Fever remains as last year.

There is reason to believe that the disease had existed at some of the newly reported centres for some time before it was recognised by farm owners. In those cases the length of time infected ticks existed on the pasture unknown to anyone is a matter of opinion which would have to be decided before the actual source of infection can be determined. In other cases there is no doubt that infected ticks were introduced on to hitherto clean pasture by movement of cattle from an infected area.

The method recommended by Government to control this disease is tick destruction and strict enforcement of cattle movement regulations. The degree of application of both these measures necessary to achieve this object varies according to the conditions obtaining in different districts. For instance rigorous three or five day dipping and fencing would be essential to obviate losses under conditions where a good rainfall or constantly moist vleis in an undulating country of protected valleys afford moisture and warmth for uninterrupted propagation of tick life; whereas seven or ten day dipping will achieve the same object over open range country of light rainfall.

Broadly speaking, the economic point of view is favourable to this aspect of East Coast Fever control. Pasture falling in the first category can be utilised for dairy farming and profits from land of that class can afford the cost of fencing off small areas required for selected deep milking cattle. Land of the latter type requires large holdings to admit of economic development as fattening pasture for beef cattle, and fencing in the initial stages is not such a vital necessity.

The two conditions I have quoted are examples of the two types of country known as "Dirty" *i.e.* infected, and "Clean" *i.e.* non-infected (as regards East Coast Fever) found in Kenya Colony.

The boundaries between these two areas were not determined by Government. They are the natural boundaries determined by the ability of the tick life necessary for the dissemination of the disease to breed uninterruptedly. Sudden temporary climatic alterations can make a "clean" area suitable for the rapid increase of ticks. An infected case at the disposal of a freshly hatched out batch of tick larvae under such circumstances can easily provide sufficient infected nymphal forms to decimate a herd provided no means of control, like regular dipping, is practised. These immature forms swarm on any available beasts and are very easily killed

by the dipping fluid. This is not always realised by owners who remark on live adult forms on regularly dipped stock. The immature larval and nymphal forms can scarcely be seen by the casual observer : they are the factor determining mortality in an outbreak of East Coast Fever.

From the foregoing the importance of early diagnosis of the first case of East Coast Fever in a herd and the regulation of dipping intervals, to conform to the local conditions of tick reproduction, will be realised.

In the report of the Chief Veterinary Research Officer will be found reference to the research work on East Coast Fever immunity that was carried out during the year. Arrangements are in hand for the extension of this work commensurate with its importance.

Returns from Government Dipping Stations for 1925.

Station.	Sheep and Goats.	Cattle.	Equines.
	No.	No.	No.
Nakuru	10,868	9,823	741
Naivasha	10,263	...	...
Isiolo	73,282	...	1,614
Nyeri	150	1,073	24
Nanyuki	...	21,384	124
	94,563	32,280	2,503

Returns from the Agricultural Chemist of Analyses of cattle dipping fluids for 1925.

Class.	Error in Strength.	1925.
Sufficiently correct ...	Not exceeding 10% ...	38·5
Seriously wrong ...	11% to 20% ...	24·0
Dangerously wrong ...	Exceeding 20% ...	37·5
Total No. of Samples analysed	...	467

CONTAGIOUS BOVINE PLEURO-PNEUMONIA.—

The position with regard to this disease as compared with 1924 is as follows :—

<i>Fresh outbreaks.</i>	1924.	1925.
Nakuru 	1	...
Uasin Gishu and Trans Nzoia...	8	10
Lumbwa 	4	2
Nyeri 	...	1

There have been no extensions from these outbreaks all of which were traced to native-owned stock that had not been inoculated.

This disease has ceased to be of economic importance to stock owners who can protect their stock by using a vaccine which is issued free on demand by the Veterinary Laboratory. 295,320 doses were issued for use in the Colony during 1925.

The following inoculations were carried out by the Veterinary Staff in Native Reserves during the year in respect of this disease :—

Bungoma Veterinary Station	...	8,301
Kibigori do. do.	...	751
Nandi do. do.	...	1,686
Waterfalls do. do.	...	18,955
Timboroa do. do.	...	12,508
Isiolo do. do.	...	1,681
Ngong do. do.	...	220

44,102

ANTHRAX.

The reported incidence of this disease decreased. 8,634 doses of Anthrax Vaccine were sold to stock owners by the Veterinary Laboratory during the year, compared with 9112 in 1924.

Outbreaks amounting to epidemics have been dealt with in the Nairobi District and doubtless the report of the Medical Department will refer to mortality in humans from eating meat of Anthrax carcasses.

The outbreaks were reported from the following districts :—

District.	No. of outbreaks.	No. of animals involved.
Nairobi 	10	1,298
Nakuru 	15	3,000
Uasin Gishu and Trans Nzoia ...	5	?
Lumbwa 	2	1,125
Nyeri 	6	5,073
	38	10,496

BLACKQUARTER.

This disease continues to cause losses in the stock farming districts. 21,900 doses of Blackquarter vaccine sold during the year by the Veterinary Laboratory is 3,350 doses less than the quantity sold during 1924.

The disease is widespread and stock owners are advised to use the vaccine as a preventative if a case occurs on a farm.

DISEASES OF POULTRY.

KIKUYU FOWL DISEASE.

Thirteen outbreaks were reported in the Nairobi Districts; 2 at Nyeri and one in the Nakuru District; which were dealt with by vaccination. Individual cases appear to recur occasionally.

The following sporadic diseases appear in Poultry; all intestinal parasites, Epithelioma contagiosa, croup, and necrosis of the legs,

CANINE DISEASES.

Distemper and Canine Piroplamosis (Tick Fever) have been very prevalent during the year. The usual treatments were prescribed by District Veterinary Officers.

Eight dogs imported from India and France were detained in the Nairobi Quarantine Station in accordance with the importation rules of the Diseases of Animals Ordinance.

BRANDS ORDINANCE 1907.

The following are the particulars of brands registered, transferred and cancelled during the period under review :—

Brands registered	...	175.
Brands transferred	...	Nil.
Brands cancelled	...	Nil.
Departmental Brands	...	2
Private	...	173
"S" Brands	...	72
"S" Administrative	...	12
Numerals—Private	...	1 set
„ Departmental	...	21 sets

DISEASES OF EQUINES.

ULCERATIVE LYMPHANGITIS.

Cases were reported during the year in the following areas :—

	1924.	1925.
Nairobi ...	11	19
Laikipia-Nyeri	6	5
Lumbwa	7	9
Uasin Gishu & Trans Nzoia	22	63
Nakuru ...	7	8
Machakos	...	1
South & Central Kavirondo	23	2
	76	107

In 1923 the total number was 77 and in 1922 the total was 130.

The majority of cases are in mules with lesions chiefly affecting the extremities. As it is difficult in most cases adequately to groom and clean the Abyssinian mule the resulting accumulation of microbe laden dust and mud is a predisposing factor.

EPIZOOTIC LYMPHANGITIS.

There is an increase in the incidence of this disease during the year. 15 cases were reported and confirmed in Nairobi District.

The following table gives the comparative statements of reported cases for the past four years :—

District.	No. of cases 1922.	No. of cases 1923.	No. of cases 1924.	No. of cases 1925.
Nairobi-Kyambu-Machakos ...	8	7	6	15
Uasin Gishu-Trans Nzoia ...	8	1	2	4
Londiani-Kisumu ...	6	2	2	1
Nakuru ...	7	2	...	3
Laikipia-Nyeri ...	...	1	3	1
Kericho-Kavirondo ...	3	3	...	...
	32	16	13	24

HORSESICKNESS.

The following outbreaks were reported during the year :—

Nakuru & Naivasha District ... 5

Nairobi District ... 2 (animals from safari)

and in Isiolo Quarantine Station a number of cases were reported in trading mobs of equines from the Northern Frontier District.

This year, 1925, may be stated to be extremely satisfactory from a Horse Sickness point of view.

STRANGLES.

An isolated outbreak was reported from the Machakos District,

CALF MORTALITY.

Economic loss from a high rate of mortality in calves is becoming increasingly noticeable on farms where dairying is of importance. The organisms common to White Scour, Redwater, Gallsickness, and Necrosis can be identified in the majority of instances. Recently further research has associated a bacillus of the diptheritic group with excessive mortality in sucking calves.

It is noticeable that calves running out with their dams are not troubled with these ailments; a fact pointing to investigation along nutritional lines, as well as pathological.

PIROPLASMOSIS, ANAPLASMOSIS.

Redwater and Gallsickness infections exist on all pastures where ticks are to be found. All stock bred on these pastures acquire immunity in calfhood.

These conditions are of economic importance where pastures have been freed from ticks by dipping and movement to tick infested pastures is necessary in the case of cattle imported from overseas.

The requirements of both these cases are met by the provision of a vaccine which confers immunity with slight risk.

In the case of valuable imported animals Government has provided a Station situated on rail near to Nairobi where imported animals are received for immunisation. The time taken to effect complete immunity to local parasites is three months and the cost approximately £10 a head.

LIVESTOCK IMPORTATIONS.

The Livestock importations through the ports of Mombasa and Kilindini are as follows and the returns of 1923 and 1924 are added for purposes of comparison :—

	1923.	1924.	1925.
Horses	30	18	36
Mules	1	9	6
Donkeys	20	111	47
Pigs	12	58	32
Cattle	323	364	906
Sheep & Goats	4,324	6,540	4,939
Dogs	68	76	100
Cats	17	7	8
Poultry & other Birds	219	319	240

The above importations included 111 purebred Bulls and 53 purebred Cows and Heifers.

A. G. DOHERTY,
Chief Veterinary Officer.

APPENDIX "D."

REPORT OF CHIEF VETERINARY RESEARCH OFFICER.

A. STAFF MOVEMENTS.—

The following Officers proceeded on Vacation Leave during the year :—

Mr. A. J. Kemp, Clerk.
Mr. G. W. Clochley, Assistant Storekeeper.
Mr. J. Burton, Overseer.
Mr. J. R. McQueen, Laboratory Assistant.

The following Officers returned from Vacation Leave :—

Mr. A. E. Johnstone, Clerk.
Mr. J. Scott, Storekeeper.
Mr. G. W. Clochley, Assistant Storekeeper.

NEW APPOINTMENTS.—

The following Officers were appointed in England, and arrived in Kenya to take up their duties during 1925 :—

Mr. R. Daubney, M.R.C.V.S., M.Bc. (Washington).
Assistant Chief Veterinary Research Officer.
Mr. E. J. Hall, Laboratory Assistant.
Mr. W. F. Bruce, Laboratory Assistant.

Temporary Appointments.—Mr. J. L. Sim, was appointed temporarily to the post of Overseer, during the period Mr. Burton was absent on vacation leave.

Vacancies.—One vacancy for a Veterinary Research Officer remained unfilled throughout the year.

Resignations.—Miss N. Judd, Junior Clerk, resigned her appointment, with effect from December 31st, 1925.

Acting Appointments.—Dr. S. H. Whitworth, acted in the post of Assistant Chief Veterinary Research Officer until the arrival of Mr. R. Daubney, in July.



Veterinary Research Laboratory, Kabeta, (Main Building).

Field Officers.—The following Officers were seconded to the Laboratory for duty during a portion of the year :—

Mr. G. B. Purvis, M.R.C.V.S.

Mr. M. H. Reid, M.R.C.V.S.

B. ADMINISTRATIVE ACTIVITIES.—

Correspondence.—3,186 Inward and 3,109 Outward communications were dealt with during 1925, a total of 6,295, and an increase of 117 over the preceding year. This is exclusive of communications received and despatched in connection with Slides and Specimens submitted for examination, or the numerous letters and papers sent to the Laboratory for minuting. Reports on 9,828 Slides and Specimens were typed and sent out during the year.

Laboratory Farm.—A further area of 25 acres of Laboratory Farm land was taken over by the Native Industrial Training Depot during 1925.

A portion of our Farm land was also allotted to the Plant Breeder for experimental wheat growing.

A quantity of Green Maize and Lucerne was grown for live-stock feeding purposes, but owing to lack of rain, this was insufficient for our purpose, and it was found necessary to purchase green maize from outside sources.

In addition to the usual cultivation, the Farm labour was also employed throughout the year on the maintenance and upkeep of roads, fences, grazing land : transport of fuel, stone, murrum, etc.

C. BUILDINGS AND PLANT.—

Buildings.—Building operations commenced during the year on a new wing of the Laboratory. This wing, when completed, is, *inter alia*, to be utilized for increased Serum production, for the installation of cold storage, and an Incubator-room, and for the accommodation of small experimental animals. This building is being erected by contract, under the supervision of the Public Works Department.

Work carried out by the Laboratory Workshop Staff included the erection of a Bath-house and Latrines for native employees, and the maintenance and repair of Laboratory and Farm Buildings, Staff Quarters, etc.

Plant.—The Gas, Steam and Electric Plants were kept running satisfactorily throughout the year. Certain new items of apparatus were installed in the Laboratory, and the Apparatus and Machinery generally were kept in an efficient state of repair.

General.—Repairs to Transport Vehicles, Farm Implements, etc. were carried out, and the making of serum and other packing cases, cattle feeding troughs, and various appliances for Laboratory use were undertaken in our own workshop.

Further improvements and extensions in the drainage and water systems were effected.

D. FINANCE :—

Expenditure.—The amount originally sanctioned for 1925, was £22,918, but in order to provide for increased serum production this sum was ultimately increased to £29,105.

Revenue.—The revenue realized from the direct sale of Laboratory Products will probably amount to about £6,040. This does not include revenue accruing from Anti-Rinderpest Serum issued to the staff of the Veterinary Division for inoculations in the Field, such revenue being credited to "Testing, Dipping Fees, etc."

Anti-Rinderpest Serum to the value of £19,440 was issued to the Field Staff during 1925, an increase of £7,005 over the value of serum so issued during 1924.

The total value of Laboratory Products issued during the year, for which charges are gazetted, is £25,007. Other products to the value of £1,478 were manufactured and issued free of charge.

The sale of surplus Laboratory Stock, not required for further experiment, realized £62.

LIVESTOCK.

SPECIES.	On Books 31-12-24.	Received during 1925.	Remaining on Books 31-12-25.
Horses ...	12	14	7
Mules ...	33	3	24
Donkeys ...	...	2	1
Cattle ...	721	875 (includes 90 births)	631
Sheep ...	48	83 (" 4 ")	65
Goats ...	15	5 (all births)	20
Pigs ...	71	33 (32 births)	24

I have again much pleasure in placing on record that the Staff, both Professional and Lay, have carried out there duties with loyalty and devotion, and take this opportunity of expressing my highest appreciation.

TECHNICAL ROUTINE :—

The number of slides and specimens submitted for examination totalled 9,828.

The technical routine work, *viz*, the preparation of anti-serum and vaccines, examination of smears, specimens, etc, increases yearly, and as the result of research work new methods which are made use of for controlling stock diseases in the Colony, have been introduced resulting in the detailing of laboratory assistants for the additional technical routine work, and a shortage of laboratory assistants for research work.

The classification of the diagnoses arrived at is as follows :—

BOVINES	TOTAL EXAMINED	9,332.
Anthrax	...	37
Anthrax, suspicious	...	2
Anthrax and suspicious East Coast	...	
Fever	...	2
Anaplasmosis	...	656
Anaplasmosis supicious,	...	1
Anaplasmosis and Redwater...	...	18
Anisocytosis	...	35
Blackquarter	...	6
Bovine Lymphangitis	...	1
Bovine Lymphangitis, suspicious	...	1
Broncho-pneumonia	...	3
Contagious Abortion	...	67
Contagious Abortion (doubtful)	...	9
East Coast Fever	...	1,145
East Coast Fever, suspicious...	...	9
East Coast Fever and Redwater	...	66
Gastritis	...	1
Interstitial Nephritis	...	1
Piroplasma, small	...	235
Pleuro-pneumonia	...	30
Pleuro-pneumonia, suspicious	...	5
Pneumonia Purulenta	...	1
Redwater	...	139
Rinderpest	...	1
Spirillosis	...	5
Spirillosis and T. parva	...	1
Tapeworm	...	1
Trypanosomiasis	...	104

Trypanosomiasis & Redwater	...	...	3
Tuberculosis	...	...	2
Negatives	...	...	6,745
EQUINES (Horses)	TOTAL EXAMINED		232
Anthrax	...	...	2
Biliary Fever	...	...	1
Epizootic Lymphangitis	...	...	10
Joint Ill, (suspicious)	...	...	3
Ulcerative Lymphangitis	...	...	53
Ulcerative & Epizootic Lymphangitis	...	...	1
Ulcerative Lymphangitis, suspicious	...	...	1
Streptothricosis	...	...	1
Negatives	...	...	84
EQUINES (Mules)	TOTAL EXAMINED		64
Epizootic Lymphangitis	...	...	9
Trypanosomiasis	...	...	6
Ulcerative Lymphangitis	...	...	20
Ulcerative and Epizootic Lymphangitis...	...	...	3
Negatives	...	...	26
EQUINES (Donkeys)	TOTAL EXAMINED		12
Epizootic Lymphangitis	...	...	1
Trypanosomiasis	...	...	1
Negatives	...	...	10
OVINES (Sheep)	TOTAL EXAMINED		40
Broncho-pneumonia	...	...	1
Pneumonia purulenta	...	...	1
Negatives	...	...	11
OVINES (Goats)	TOTAL EXAMINED		27
Broncho-pneumonia	...	...	4
Cestrus ovis	...	...	1
Pysemic Hepatitis	...	...	1
Awaiting diagnosis	...	...	1
Negatives	...	...	20
CANINES	TOTAL EXAMINED		113
Anæmia	...	...	1
Tick Fever	...	...	54
Haemorrhage (Internal)	...	...	1
Rupture of Uterus	...	...	1
Trypanosomiasis...	...	...	1
Negatives	...	...	55

PORCINES		TOTAL EXAMINED			5
Adenomatous tumour	...	...	...	...	1
Negatives	...	...	...	...	4
CAMELS		TOTAL EXAMINED			14
Negatives	...	...	...	...	14
CAPRINES		TOTAL EXAMINED			3
Anthrax	...	...	...	...	2
Broncho-pneumonia	...	...	...	...	1
AVIANS	(Fowls)	TOTAL EXAMINED			71
Aspergillosis	...	...	...	...	2
Egg bound	...	...	...	...	1
Enteritis	...	...	...	...	5
Kikuyu Fowl Disease	...	...	...	...	20
Peritonitis	...	...	...	...	3
Rupture of Liver	...	...	...	...	2
Barcoma of Liver	...	...	...	...	1
Tapeworm	...	...	...	...	3
Tuberculosis	...	...	...	...	2
Chicken-pox	...	...	...	...	1
Worm infestation	...	...	...	...	1
Negatives	...	...	...	...	30
AVIANS	(Turkeys)	TOTAL EXAMINED			10
Chicken-pox	...	...	...	...	1
Kikuyu Fowl Disease	...	...	...	...	3
Suspicious Roup...	..	...	...	...	1
Negatives	...	...	...	...	5
AVIANS	(Ducks)	TOTAL EXAMINED			3
Fractured spine	...	...	...	...	1
Cholera	...	...	...	...	1
Negatives	...	...	...	...	1
AVIANS (Guinea Fowls)		TOTAL EXAMINED			1
Tapeworm infestation	...	...	...	...	1
TICKS		TOTAL EXAMINED			1
Hyalomma asgyptium	...	...	...	...	1
HARTEBEEEST		TOTAL EXAMINED			1
Oestrid Larvac	...	...	...	...	1
WILDEBEEESTE		TOTAL EXAMINED			1
Negatives	...	...	...	...	1
ZEBRA		TOTAL EXAMINED			1
Negatives	...	...	...	...	1

LABORATORY PRODUCTS STATEMENT FOR THE YEAR ENDING 31st DECEMBER, 1925.

74

Products.	Balance on hand 31-12-24.	Received from Laboratory 1st Jan. 1925 to 31st Dec. 1925.	Issues for 1925.	Returned to Laboratory.	Balance on hand 31-12-25.
Anti-Rinderpest Serum	2,428,080	{ 1,945,600 11,169,970	12,151,800	650,500	4,042,350
Blackquarter Vaccine, 1st	2,560	22,530	21,900	...	Tanganyika c. cs.
Blackquarter Vaccine, 2nd	2,560	22,530	21,820	60	3,190 doses.
Trypanblue, canine	110	557	520	...	3,330 "
Trypanblue, bovine	122	417	471	...	147 "
Colon Bacillosis Vaccine	1,235	9,700	9,132	...	68 "
Kikuyu Fowl Disease	...	8,472	8,472	...	1,803 "
Ulcerative Lymphangitis	62	256	234	...	...
Anthrax Vaccine, single	3,045	...	...	...	84 courses.
Anthrax Vaccine, 1st	10,730	43,080	24,766	880	3,045 doses.
Anthrax Vaccine, 2nd	10,930	41,320	30,206	1,080	29,924 "
Bluetongue Vaccine	14,316	...	1,052	1,530	23,124 "
Wireworm remedy	40,200	493,400	414,400	...	14,794 "
Pleuro-pneumonia Vaccine	...	295,320	295,320	...	119,200 "
Redwater and Anaplasmosis	...	1,893	1,893	...	...
Sheep-pox Vaccine	...	28,060	28,060	...	...

LABORATORY PRODUCTS STATEMENT OF ISSUES FOR THE YEAR ENDING 31st DECEMBER, 1925.

Products.	Issued to Stock-owners.	Department Officers.	Other Countries.	Laboratory Experiment.	Written Off.	Total.
Anti-Rinderpest Serum	...	9,719,950	1,820,000	48,650	483,700	12,151,800 e. cs.
Blackquarter Vaccine 1st	...	15,070	500	...	...	21,900 doses.
Blackquarter Vaccine 2nd	...	14,990	500	...	...	21,820 "
Trypanblue, canine	...	433	...	...	...	520 "
Trypanblue, bovine	...	315	...	...	...	471 "
Colon Bacillosis ...	...	9,028	...	54	...	9,132 "
Kikuyu Fowl Disease	...	8,472	...	...	...	8,472 "
Ulcerative Lymphangitis	...	61	...	...	...	234 courses.
Anthrax Vaccine 1st	...	8,634	...	440	1,136	30,206 doses.
Anthrax Vaccine 2nd	...	8,394	...	...	736	24,766 "
Bluetongue Vaccine	...	1,050	...	...	...	1,052 "
Wireworm remedy	...	374,400	...	...	...	414,400 "
Pleuro-pneumonia Vaccine	...	37,590	6,650	...	...	295,320 "
Redwater and Anaplasmosis	...	1,792	...	...	...	1,893 "
Sheep-pox Vaccine	...	28,060	...	...	...	28,060 "

TECHNICAL RESEARCH.—

The Technical Research carried out during the period under review included the following :—

DISEASES OF CATTLE.

RINDERPEST.—

(1). *Immunisation.*—

In order to overcome the difficulties which are sometimes encountered in combatting rinderpest in the field, methods other than those usually employed have on occasions been resorted to e.g.,

- (1). Blood collected from a beast reacting to double inoculation has been substituted for virulent blood of a virus maker.
- (2). Cattle under “serum alone” treatment have been double inoculated.

On different occasions the following points have been raised, *viz.*—

Does the inoculation of blood, other than fresh, of a reacting virus maker transmit rinderpest to susceptible cattle under “serum alone” treatment ?

Does fresh blood and blood stored for 20 hours or thereabouts, respectively, collected from a virus maker at the termination of the temperature reaction when the temperature has fallen, produce rinderpest ?

Is coagulated blood of a reacting virus maker virulent ?

Experimental work was undertaken with a view to determining the efficacy of the above-mentioned departures from the recognised practice and to elucidate the points raised.

NOTE.—

The term “double inoculation” signifies the subcutaneous injection of virulent blood and simultaneously, at another site, anti-rinderpest serum.

1. *The substitution of fresh blood of a beast reacting to double inoculation for fresh blood of a reacting virus maker.*—

On various occasions susceptible cattle have been successfully double inoculated with fresh blood of a beast reacting to double inoculation, and anti-serum.

2. *Double inoculation of cattle under "serum alone" treatment.—Experiment 1713 of 10-10-25.—*

Two grade cattle, Nos. x235 and x237, aged $3\frac{1}{4}$ and 2 years, respectively, were injected on the 30-10-25 with anti-serum at the rate of 20 c.cs per 100 kilos, body weight, and two grades, Nos. x236 and x266, aged 15 and 12 months, respectively, on the same date, with anti-serum at the rate of 30 c.cs per 100 kilos.

Nos. x236 and x237 were double inoculated on the 5-11-25 *viz*, 6 days later, with 2 c.cs *fresh* blood of a reacting virus maker and anti-serum at the rate of 20 c.cs per 100 kilos, and x235 and x266 on the 7-11-25, *viz*, 8 days later, with 2 c.cs *fresh* blood of a reacting virus maker and anti-serum at the rate of 30 c.cs per 100 kilos.

Result.—

Nos. x235 and x237 reacted to rinderpest after an incubation period of 5 and 3 days, respectively.

Nos. x236 and x266 reacted to rinderpest after an incubation period of 4 days, respectively.

Nos. x236, x237 and x266 were utilised for virus making purposes. No. x235 was kept for further observation and survived.

Summary of Experiment 1713 of 10-10-25.—

The inoculation of *fresh* virulent blood and anti-serum at the rate of 20 and 30 c.cs, respectively, per 100 kilos, body weight, produced a reaction in susceptible cattle which were injected 6 and 8 days previously, respectively, with anti-serum at the rate of 20 and 30 c.cs, per 100 kilos, respectively.

Does the inoculation of, other than fresh, blood of a reacting virus maker transmit rinderpest to susceptible cattle under "serum alone" treatment?—

Previous experimental work recorded by the writer in Bulletin No. 2, 1921, Department of Agriculture, Division of Veterinary Pathology, and Bulletin No. 4, 1922, Department of Agriculture, Division of Veterinary Research, showed that whereas the inoculation of fresh virulent blood and virulent blood stored for 24, 30 and 40 hours, respectively, at room temperature produced rinderpest in susceptible cattle, inoculation of susceptible cattle with blood stored for 24, 30 and 40 hours, respectively, and varying rates of anti-serum did not always transmit rinderpest, it was thus reasonable to conclude that the inoculation of virulent blood, other than fresh, and anti-serum would not always transmit rinderpest to cattle under "serum alone" treatment.

The following experiment was carried out to confirm or disprove this.—

EXPERIMENT NO. 1725 OF 10-12-25.

Does the inoculation of susceptible cattle, under "serum alone" treatment, with virulent blood, other than fresh, produce rinderpest?—

Three grade cattle, Nos. x338, x335 and x341, aged 20, 20 and 24 months, respectively, were injected on the 10-12-25, each with anti-serum at an index dose of 20 c.cs per 100 kilos, body weight. No. x338 was inoculated on the 18-12-25, viz, 8 days later with 2 c.cs of blood stored at room temperature for 24 hours: No. x335 on the 18-12-25 with 2 c.cs of blood stored for 30 hours and x341 on the 19-12-25, viz, 9 days later, with 2 c.cs of blood stored for 48 hours.

Result.—

x338, a temperature reaction to East Coast Fever naturally contracted, commenced on the day after. The animal died of East Coast Fever on the 24-12-25.

x335 reacted to rinderpest after an incubation period of 6 days and was subsequently destroyed for virus.

x341, a reaction to rinderpest commenced after an incubation period of 9 days: the animal was subsequently destroyed for virus.

Summary of Experiment No. 1725.—

Blood stored for 30 hours at room temperature produced rinderpest in a beast injected 8 days previously with anti-serum at the rate of 20 c.cs per 100 kilos.

Blood stored for 40 hours produced no reaction or a delayed reaction, in a beast injected 9 days previously with anti-serum at the rate of 20 c.cs per 100 kilos, body weight.

No definite conclusion as to the result of inoculation of the 24 hours old blood was arrived at.

Does fresh blood and blood stored for 20 hours, respectively, collected from a virus maker at the termination of the temperature reaction when the temperature has fallen, transmit rinderpest?—

EXPERIMENT NO. 1678 OF 26-5-25.

(a) Double inoculation with fresh blood and anti-serum at the rate of 20 c.cs per 100 kilos.

(b) Double inoculation with blood of the same bleeding stored for 20 hours at room temperature and anti-serum at the rate of 20 c.cs per 100 kilos.

(c) VIRULENCY OF FRESH BLOOD AND THE BLOOD OF THE SAME BLEEDING STORED FOR 20 HOURS.

The virulent blood was obtained from C. 9759. C. 9759 was double inoculated on the 15-5-25 with 2 c.cs virus and anti-serum at the rate of 20 c.cs per 100 kilos; a temperature reaction to rinderpest commenced on the 4th day and continued until the 9th day, maximum 106° Fahr on the 7th day; on the 10th day, the temperature dropped to 102° Fahr, and ran a normal curve from the 12th day, 9759 was bled on the 11th day, the temperature being 102° Fahr.

C. 9747 was inoculated with fresh virus of the 11th day and anti-serum at the rate of 20 c.cs per 100 kilos.

C. 9790 was inoculated with blood of the same bleeding stored for 20 hours and anti-serum at the rate of 20 c.cs per 100 kilos.

C. 9748 got 2 c.cs fresh virus of the 11th day.

C. 9785 got 2 c.cs blood of the same bleeding stored for 20 hours at room temperature.

RESULT.—

9747 and 9748 reacted to rinderpest.

9790 and 9785 did not react.

9790 was subsequently tested on its immunity and proved susceptible.

9785 contracted rinderpest by contact.

SUMMARY OF EXPERIMENT 1678.—

Fresh blood collected at the termination of the rinderpest reaction when the temperature had dropped to 102° Fahr produced a reaction to rinderpest when inoculated simultaneously with anti-serum at the rate of 20 c.cs per 100 kilos.

Fresh blood alone of the same bleeding produced rinderpest.

Blood of the same bleeding stored for 20 hours and anti-serum simultaneously inoculated did not transmit rinderpest.

Blood alone of the same bleeding stored for 20 hours did not transmit rinderpest.

THE VIRULENCY OF COAGULATED BLOOD.—

Experiment No. 1677.

Blood of a reacting virus maker was collected without shaking, in equal parts of 0.59 citrate solution, in a bottle similar to that used for the collection of virulent blood in the field; almost complete coagulation occurred; sufficient liquid was obtained for the inoculation of three susceptible cattle each with 2 c.cs and anti-rinderpest serum at the rate of 20, 30 and 45 c.cs, respectively, per 100 kilos, body weight.

RESULT.—

All reacted to rinderpest.

2. POTENCY TESTS.—

Experiments, Nos. 1695 and 1698 of the 18-7-25 and 11-8-25, respectively.

Potency tests of some of the lots of anti-rinderpest serum, viz., lots 17 and 18, prepared at M'papua Veterinary Laboratory, Tanganyika Territory, and purchased for use in Kenya Colony were made.

The cattle utilised were low grade $\frac{1}{4}$ and $\frac{1}{2}$ grades, varying in age from about 15 months to 3 years, approximately; they were housed and kept under close observation. The average dose recommended by the manufacturers is 30 c.cs for active and passive immunization, respectively.

The serum was tested at the rate of 10, 20 and 30 c.cs, respectively, per 100 kilos, body weight.

RESULTS.—

At the rate of 10 c.cs and 20 c.cs, respectively, per 100 kilos, body weight, a 50% mortality occurred.

(4 in Experiment).

At the 30 c.cs rate, per 100 kilos, a 16% mortality.

(6 in Experiment).

The potency of Tanganyika anti-serum at the above rates was not sufficient to overcome the differences in individual susceptibility of Kenya cattle and would explain why a serum which is not very potent, protects one animal but not another at a similar index dose,



Veterinary Research Laboratory, Kabete.
(Stock Sheds & Paddocks).

For the routine potency tests of anti-rinderpest serum prepared at Kabete, $\frac{1}{4}$ and $\frac{1}{2}$ grade cattle born and reared in the Colony, of about 2 years old, are simultaneously inoculated with 2 c.cs citrated blood and anti-rinderpest serum at varying rates, viz, 15, 20 and 30 c.cs, per 100 kilos, body weight, which practically always protects at these rates.

It was accordingly recommended that the Tanganyika anti-serum be used at the rate of, at least, 30 c.cs per 100 kilos, body weight.

3. FIELD INVESTIGATIONS.—Rinderpest immunisation.—

The cause of susceptible cattle failing to react to double inoculation was investigated on two occasions.

In the one, the use of other than fresh Virulent Blood, in the other, the use of blood which was subsequently proved to be non-virulent, was found to be responsible.

GENERAL SUMMARY.—Rinderpest.—

1. Fresh blood collected from a beast reacting to double inoculation invariably produced rinderpest in susceptible cattle.

2. Cattle under "serum alone" treatment reacted to the inoculation of fresh blood of a reacting virus maker, and anti-serum.

3. Other than fresh blood of a virus maker does not always transmit rinderpest to susceptible cattle under "serum alone" treatment.

Previous experiments shewed that susceptible cattle double inoculated with other than fresh blood and varying rates of anti-serum do not always react to rinderpest.

4. Fresh blood collected from a virus maker at the termination of the temperature reaction when the temperature had fallen to normal and inoculated with, or without anti-serum, produced rinderpest.

Blood of the same bleeding stored for 20 hours at room temperature and inoculated to susceptible cattle with or without anti-serum did not transmit rinderpest.

5. Blood of a reacting beast which had not defibrinated on bleeding into citrate solution transmitted rinderpest.

6. The potency of Tanganyika anti-rinderpest serum at the prescribed average dose of 30 c.cs was not sufficient to overcome the differences in individual susceptibility of low grade Kenya Colony cattle.

7. The use of other than fresh virulent blood and the use of non-virulent blood was found responsible for non-reactions in rinderpest immunisation field operations.

REDWATER AND GALLSICKNESS IMMUNISATION.—

The procedure adopted in immunising imported cattle against Redwater and anaplasmosis at the Quarantine Station, Nairobi, is as follows, *viz.*—

The cattle are first vaccinated with blood of a vaccine producer which variably produces a reaction to redwater and invariably to *Anaplasma centrale*; towards the end of the centrale reaction they are re-inoculated with blood of a beast which has recovered from redwater and *Anaplasma marginale*, contracted naturally; at the termination of the *Anaplasma marginale* reaction they are handed over to the owners; from the date of entry till date of discharge they are kept under close Veterinary observation, temperatures are recorded daily, and smears collected daily and forwarded to the laboratory for examination.

It has thus been possible to follow closely the results of inoculation of the cattle submitted for immunisation.

The vaccine employed for the original inoculation is obtained from either of the two vaccine producers, *viz.* Hereford heifer, No. 2, and grade steer No. 8844.

Hereford Heifer, No. 2.—Was purchased in Great Britain and arrived in this Colony in August, 1921, after undergoing redwater and *Anaplasma centrale* immunisation at the Veterinary Research Laboratory, Onderstepoort, South Africa.

Grade Steer, 8844.—Was born and reared at Kabete and has been kept tick free from birth: it was inoculated with the Redwater-*Anaplasma centrale* strain of vaccine on the 12-6-24.

The inoculation of blood of either of the two abovementioned vaccine cattle produces a temperature reaction to redwater in about 60% of susceptible cattle and to *Anaplasma centrale* in 100%. The cattle submitted for immunisation varied in age from about 20 months and upwards.

The reaction to redwater manifests itself usually in a sharp rise of temperature reaching 105° Fahr, or over, on or about the 5th or 6th day, and returning to normal after about 24 hours: in such cases redwater parasites have not been detected in the blood smears; in some instances, the temperature has remained elevated for a longer period, *viz.* 4-6 days; only in an exceptional case is treatment with Trypan blue necessary.

The blood used for re-inoculation, as stated above, is obtained from a beast (No. 8254) recovered from redwater and *Anaplasma marginale* naturally contracted. The history of 8254 is as follows, *viz.*—Grade, aged 4 years. Kept stabled since 20-1-23 under tick free conditions. On the 20-1-23, inoculated with blood of a beast recovered from redwater-gallsickness naturally contracted. Redwater parasites were detected in smears of the 9th, 10th and 18th day, after inoculation: mild temperature reaction from the 5th day; recovered without treatment. Observations during the year showed that the blood of 8254 was not producing redwater reactions as hitherto and it was decided to re-inoculate 8254 with blood containing redwater parasites: as the result of re-inoculation a reaction to redwater occurred and the beast recovered without treatment. Blood smears during the reaction showed redwater parasites frequent.

Blood of 8254 has since been used for re-inoculation of several cattle previously vaccinated with the redwater-*Anaplasma centrale* blood and has always produced a well marked reaction to redwater necessitating the use of trypan blue.

The results of immunisation of imported cattle at the Quarantine Station has been satisfactory: no mortality has occurred. In one instance, an owner reported redwater in two of his four cattle immunised at the Quarantine Station after they were handed over and exposed on his farm, in one with fatal results; smears were collected from the latter and forwarded for examination, but they were unsuitable for examination and it was thus not possible to confirm the owner's report.

Breeding and rearing of Redwater-Gallsickness vaccine producers.

Hitherto cattle were obtained from Great Britain and vaccinated at the Veterinary Research Laboratory, Onderstepoort Pretoria, prior to their arrival in Kenya Colony: latterly cattle for vaccine producing purposes have been obtained from the laboratory breeding herd. Cows heavy in calf are kept, after being cleaned of ticks, in a tick free stable where they calve: the calves stabled with their mothers in the tick free stable and subsequently vaccinated with the Redwater-*Anaplasma centrale* vaccine.

The results have been satisfactory.

EAST COAST FEVER.—

The desirability of carrying out research work with a view to the elucidation of some of the obscure points which exist having been emphasised by the Hon. The Director of Agriculture, investigations in connection with the nature of the immunity

conferred by natural infection were commenced in 1924 : it was hoped to have available for re-exposure during 1925 a fairly large number of cattle definitely known to have reacted to natural infection, but owing to an outbreak of Trypanosemiasis in the herd during the period they were exposed at Kilungu, losses occurred : a few other cattle definitely known to have recovered from natural infection were, however, available, these, as well as a number which were inoculated for East Coast Fever and subsequently exposed, were re-exposed during 1925.

During 1925, the immunisation experimental work commenced in 1924 the results of which were included in the Annual Report of the Hon. The Director of Agriculture for the year ending, December 31st, 1924 was continued : a number of cattle kindly placed at our disposal by owners and laboratory cattle being utilised, for the purpose : in order to obtain data in connection with the inoculation and subsequent exposure of calves regarding which little has been recorded in the literature, a number of calves were put in experiment.

The co-existence or superimposition, of other tick-borne diseases, *viz.* Redwater, Gallsickness, and Spirillosis with East Coast Fever consequent on inoculation, or natural infection and the recurrence of these infections in cattle undergoing East Coast Fever immunisation were found to be responsible for an increase in the death rate ; theoretically the sequence of occurrence of the commoner tick-borne diseases in calves in endemic areas would be as follows :—

- (1). East Coast Fever.
- (2). Spirillosis.
- (3). Redwater.
- (4). Anaplasmosis.

Some of these no doubt co-exist with, or are superimposed to East Coast Fever and hence the difficulty of accurately determining the mortality directly due to East Coast Fever : with a view to obtaining some data on the incidence of mortality in non-inoculated calves, a few non-inoculated weaned and unweaned calves were exposed.

The grazing conditions and watering facilities in the exposed camp were not always favourable owing to a long spell of dry weather ; and no shelter was available, consequently the exposure of inoculated cattle to natural infection was not always carried out under the best of field conditions ; a loss of condition and consequent lessened resistance, with an increase in the death rate, occurred, particularly in calves. Experimental work in connection with East Coast Fever immunisation necessitated

careful daily observations, the daily recording of temperatures, collection and careful examination of smears; it was originally intended to complete the immunisation process by infecting inoculated cattle with nymphae or adult ticks which had engorged as larvas or nymphae on a reacting East Coast Fever beast; for this purpose batches of ticks were reared, but owing to the uncertainty of their transmitting East Coast Fever, it was decided to re-expose inoculated cattle to natural infection in a highly infected camp at the laboratory; this camp was also subsequently made use of for re-exposing cattle which were definitely known to have reacted to natural infection.

Exposed cattle were kept under careful daily observation: temperatures recorded daily: smears collected and carefully examined, in addition they were removed after a period of exposure to a clean area where they were kept under careful observation and subsequently re-exposed: the investigations consequently occupied much time and results were slow in obtaining.

A summary of the work and results are now given:—

- (1). Inoculation and subsequent exposure of calves.
- (2). Exposure of non-inoculated weaned calves.
- (3). Exposure of non-inoculated unweaned calves.
- (4). Inoculation and subsequent exposure of cattle other than calves.—

(a) Grade cattle recovered from Redwater and Gallsickness.

(b) Grade cattle not recovered from Redwater and Gallsickness.

- (5) *Re-exposure experiments.*—

(a) Cattle exposed after inoculation and subsequently re-exposed.

(b) Cattle recovered from natural infection and subsequently re-exposed.

- (1). *Inoculation and subsequent exposure of calves.*—

(a) Intrajugular inoculation of 46 calves varying in age from 5-16 months with 10 c. cs. spleen pulp mixed with peptone: 15 were exposed to natural infection from the 44th day, 22 from the 93rd day, and 1 from the 116th day, after inoculation.

History of calves.—

Weaned 10 days after inoculation: dipped from birth till date of exposure, susceptible to East Coast Fever and, in some instances, had escaped redwater and gallsickness.

SUMMARY OF RESULTS.—

Reacted to East Coast Fever, from inoculation, and recovered	...	1	...	} = 2.17%
(Total inoculated 46)	...	...	...	

Reacted to East Coast Fever, when exposed, and recovered	...	18	...	} = 47.36%
(Total exposed 38)	...	...	...	

Reacted to East Coast Fever, when re-exposed, and recovered	...	5	...	} = 17.85%
(Total re-exposed 28)	...	...	...	

Died of East Coast Fever, from inoculation	...	...	1	...	} = 2.17%

Died from other causes resulting from inoculation	...	...	5	...	} = 10.86%

Died of Redwater, on exposure	...	3	...	} = 7.89%

Died of East Coast Fever, on re-exposure	...	...	7	...	} = 25%
(Total re-exposed 28)	...	...	...	...	

Percentage of mortality from inoculation and exposure	...	...	...	} = 45.92%

Reactions occurred to the following:—

From inoculation.—

Gonderia mutans	...	...	38	...	} = 89.13%
do.	...	...	3	...	

When exposed.—

Redwater	...	...	14	...	} = 47.36%
Spirillosis	...	...	1	...	
Anaplasmesia	...	...	3	...	

(b) Intrajugular injection of 45 calves varying in age from a few weeks to 10 months, with 10 c.cs. spleen pulp mixed with peptone followed 73 days later with an intrajugular injection of 10 c.cs. spleen pulp mixed with peptone with or without soaking in 0.65% quinine hydrochlorida solution, 14 were exposed from the 54th day and 18 from the 83rd day after inoculation,

History of calves.—

Weaned a month subsequent to the second inoculation, dipped from birth till date of exposure, susceptible to East Coast Fever and, in some cases, had escaped redwater and gallsickness.

SUMMARY OF RESULTS.—

Reacted to East Coast Fever, from inoculation and recovered ...	12	...	} = 26.66%
(Total inoculated 45) ...	...	...	

Reacted to East Coast Fever and redwater, when exposed, and recovered ...	3	...	} = 9.37%
(Total exposed 32) ...	...	...	

Reacted to East Coast Fever and Spirillosis, when exposed, and recovered ...	2	...	} = 6.25%
(Total exposed 32) ...	...	...	

= 15.62%

Died of East Coast Fever, when exposed ...	12	...	} = 37.5%
...	...	...	

Died of East Coast Fever complicated with redwater, when exposed ...	7	...	} = 21.87%
...	...	...	

Died of East Coast Fever complicated with spirillosis, when exposed ...	2	...	} = 6.25%
...	...	...	

Died of East Coast Fever complicated with anaplasmosis, when exposed. ...	3	...	} = 9.37%
...	...	...	

Died of East Coast Fever complicated with spirillosis, and redwater, when exposed ...	1	...	} = 3.12%
...	...	...	

Died of East Coast Fever complicated with spirillosis, redwater and anaplasmosis, when exposed ...	1	...	} = 3.12%
...	...	...	

Died of other causes ...	1	...	} = 3.12%
...	...	...	

(Total exposed 32). Total mortality 27. = 84.37%

Reactions also occurred to the following.—

From inoculation.—

Anaplasmosis ...	7	...	} = 15.55%
...	...	...	

(e) Intra-splenic and intrajugular injection, respectively, of grade calves varying in age from, approximately, 4-11 months, 8 inoculated intra-splenic and 8 intrajugular each with 10 c.cs. spleen pulp mixed with peptone.

15 were exposed to natural infection from the 16th day after inoculation.

History of calves.—

Weaned on date inoculated; dipped from birth till date of exposure, susceptible to East Coast Fever; recovered from redwater and gallsickness prior to inoculation.

SUMMARY OF RESULTS.—

Reacted to East Coast Fever, from inoculation and recovered	...	2	...	} = 12.5%
(Total inoculated 16)	...	...	...	
Reacted to East Coast Fever, recurrence of redwater, when exposed, and recovered	...	6	...	} = 40%
(Total exposed 15)	...	...	...	
Died of East Coast Fever, from inoculation	...	1	...	} = 6.25%
Died of East Coast Fever when exposed	...	1	...	
Died of East Coast Fever with recurrence of redwater, when exposed	...	1	...	} = 6.66%
	...	...	...	
Died of East Coast Fever with recurrence of redwater and spirillosis	...	2	...	} = 13.33%
	...	...	...	
Died of East Coast Fever with recurrence spirillosis	...	1	...	} = 6.66%
	...	...	...	
Total mortality from inoculation and exposure	...	6	...	} = 39.56%
	...	...	...	

(d) Intra-splenic inoculation of 12 grade calves, varying in age from, approximately, 8-13 months, with 10 c.cs spleen pulp mixed with peptone and exposed to natural infection from the 20th day after inoculation.

History of Calves.—

Weaned day inoculated, dipped from birth till day of exposure, susceptible to East Coast Fever, recovered from redwater and gallsickness. 6 had been previously inoculated for East Coast Fever, one of which reacted to East Coast Fever.

SUMMARY OF RESULTS.—

Reacted to East Coast Fever from inoculation and recovered ...	4	...	} = 33·33%
(Total inoculated 12) ...	...	...	
Reacted to East Coast Fever, when exposed, and recovered ...	2	...	} = 16·66%
(Total exposed 12) ...	...	...	
Reacted to East Coast Fever, when exposed, with recurrence of redwater and recovered ...	3	...	} = 25%
...	...	...	
Died of East Coast Fever on exposure ...	1	...	} = 8·33%
...	...	...	
Died of East Coast Fever with recurrence of redwater on expos- ure ...	4	...	} = 33·33%
...	...	...	
Died of East Coast Fever with recurrence of spirillosis on expos- ure ...	1	...	} = 8·33%
...	...	...	
Died of East Coast Fever with recurrence of spirillosis and anaplasmosis on exposure ...	1	...	} = 8·33%
...	...	...	
Total ...	7	...	= 58·33%

(2) *Exposure of 10 non-inoculated weaned calves, varying in age from 5-8 months, to natural infection.—*

History of Calves.—

Weaned on date exposed, dipped from birth, susceptible, to East Coast Fever, immunised against redwater and gallsickness.
SUMMARY OF RESULTS.—

Reacted to East Coast Fever with recurrence of redwater and re- covered ...	1	...	} = 10%
(Total exposed 10) ...	...	...	
Died of East Coast Fever ...	5	...	= 50%
Died of East Coast Fever and recurrence of redwater ...	3	...	} = 30%
...	...	...	
Died of East Coast Fever and recurrence of spirillosis ...	1	...	} = 10%
...	...	...	
Total ...	9	...	= 90%

- (3) *Exposure of non-inoculated unweaned calves, varying in age from 2-3 weeks, to natural infection running with their mothers, 3 of which were susceptible to East Coast Fever and 1 immune.—*

History of calves.—

Dipped from birth : susceptible to East Coast Fever, redwater and gallsickness.

Results.—

Reacted and died of East Coast Fever	3	...	=	75%
Reacted to East Coast Fever and died of redwater	...	...	1	...
			}	= 25%
(Total exposed 4)	...			
(Total mortality)	...	4	...	}
				= 100%

Note.—

Calf immune mother died of East Coast Fever.

- (4) *Inoculation and exposure to natural infection of cattle other than calves.—*

(a) *Grade cattle recovered from redwater & gallsickness.*

(b) *Grade cattle not recovered from redwater & gallsickness.*

(a) *Grade cattle recovered from redwater & gallsickness.*

(a) 17 head varying in age from 12-20 months.

8 inoculated intra splenically with 15 c.cs spleen pulp plus peptone.

9 inoculated intra-jugularly with 10 c.cs spleen pulp plus peptons.

6 exposed to natural infection from the 23rd day after inoculation.

10 exposed to natural infection from the 17th day after inoculation.

History.—

The cattle were reared on a dairy farm in an East Coast Fever area and were stunted in growth and in rather poor condition. Immunised against redwater and gallsickness: dipped regularly from birth, believed to be susceptible to East Coast Fever.

Summary of Results.—

Reacted to East Coast Fever, from inoculation, and recovered ...	2	...	} = 11·76%
(Total inoculated 17) ...	...		
Reacted to East Coast Fever, when exposed, and recovered ...	6	...	} = 37·50%
(Total exposed 16) ...	...		
Reacted to East Coast Fever, when exposed, with recurrence of red- water and spirillosis, and recovered ...	2	...	} = 12·5%
(Total exposed 16) ...	...		
Reacted to East Coast Fever, when exposed, with recurrence of red- water and recovered ...	1	...	} = 6·25%
Reacted to East Coast Fever, when exposed, with recurrence of spiril- losis and recovered ...	2	...	} = 12·5%
Died of East Coast Fever, from inoculation ...	1	...	} = 5·88%
Died of East Coast Fever, when exposed ...	2	...	} = 12·5%
Total mortality from inoculation and exposure ...	3	...	= 18·38%

(b) Cattle recovered from redwater and gallsickness.—

12 head, aged $2\frac{1}{2}$ years, approximately.

- 10 inoculated intra-splenically with 15-40 c. cs. of spleen pulp plus peptone.
- 2 inoculated intra venously with 10 c. cs. spleen pulp plus peptone.
- 12 exposed to natural infection from the 25th day after inoculation,

History.—

Born and reared on clean farms in non-infected East Coast Fever areas.

Summary of Results.—

Reacted to East Coast Fever, from inoculation, and recovered (Total inoculated 12)	...	1	...	} = 8·33%
Reacted to East Coast Fever, from exposure, and recovered (Total exposed 12)	..	7	...	} = 58·33%
Died from other causes, result of inoculation	...	1	...	} = 8·33%
Died from East Coast Fever on exposure	...	1	...	} = 8·33%
Died from East Coast Fever, on exposure, complicated with spirillosis	...	1	...	} = 8·33%
Destroyed owing to poor condition as result of East Coast Fever, from exposure, and recurrence of redwater	...	1	...	} = 8·33%
Total mortality from inoculation and exposure	...	4	...	} = 33·33%

(c) Cattle recovered from redwater and gallsickness.

8 head, 18 months old, approximately.

- 4 inoculated intra-jugular with 10 c. cs. spleen pulp plus peptone soaked for $\frac{1}{2}$ hour in 0·65% quinine hydrochloride solution.
- 4 inoculated intrajugular with 10 c. cs. spleen pulp plus peptone.
- 4 exposed to natural infection from the 41st day.

History.—

Born and reared on a redwater-gallsickness farm: not dipped: breed, Boran cross: susceptible to East Coast Fever and rinderpest. Inoculated against rinderpest 7 days prior to East Coast Fever inoculation.

Summary of Results.—

Reacted to East Coast Fever from inoculation, and recovered ...	4	...	} = 50%
(Total inoculated 8) ...	...	...	
Reacted to East Coast Fever when exposed, and recovered	1	...	} = 25%
(Total exposed 4) ...	...	...	
Died of East Coast Fever due to inoculation ...	2	...	} = 25%
Total mortality due to East Coast Fever ...	2	...	
Died of other causes other than due to East Coast Fever, <i>viz.</i> Dipping and Rinderpest ...	2	...	} = 25%

(g). GRADE CATTLE NOT RECOVERED FROM RED-WATER AND GALLSICKNESS.—

(a). Inoculation of 20 grade cattle, aged, approximately, 2 years.—

8 inoculated intrajugularly with spleen pulp plus peptone soaked in 0.65% quinine hydrochloride solution for $\frac{1}{2}$ an hour.

7 inoculated intrajugularly, on three separate occasions, with spleen pulp plus peptone soaked in 65% quinine hydrochloride solution, and once, intrajugularly with spleen pulp and peptone.

6 exposed to natural infection from the 30th day.

11 " " " " " " 18th "

HISTORY.—

Born and reared on a farm where dipping has been regularly carried out for some years.

Believed to be susceptible to East Coast Fever, Redwater and Gallsickness.

SUMMARY OF RESULTS.—

Reacted to East Coast Fever from inoculation, and recovered ...	10	...	} = 50%
(Total inoculated 20) ...	...	...	
Reacted to East Coast Fever and Redwater, when exposed ...	2	...	}
Reacted to East Coast Fever when exposed ...	2	...	
(Total exposed 17) ...	...	...	} = 23.52%
Died of East Coast Fever, from inoculation ...	1	...	
Died of East Coast Fever, when exposed ...	0	...	} = 0%
Total mortality from East Coast Fever ...	1	...	
Died of Anaplasmosis from inoculation ...	2	...	} = 10%
Died of Anaplasmosis from inoculation, complicated with Redwater and Spirillosis, from exposure...	2	...	
Died of Redwater, when exposed ...	1	...	} = 5.88%
Total mortality (from inoculation and exposure) from causes other than East Coast Fever ...	5	...	
			= 25.88

NOTE.—

of the total inoculated,	16	reacted to Anaplasmosis as result of inoculation, none to redwater.
of the total exposed	8	reacted to Redwater, (natural infection).
	3	reacted to Redwater and Spirillosis.
	1	reacted to Spirillosis,

Re-exposure experiments.—

- (a) Cattle exposed after inoculation and subsequently re-exposed.
- (b) Non-inoculated cattle recovered from natural infection and subsequently re-exposed.
- (a) Cattle exposed after inoculation and subsequently re-exposed.

The number re-exposed totalled.....64.

The following reacted to natural infection on two occasions.

*C. 8875 Grade.**History.*—

Date of birth 26-11-23, the progeny of the laboratory breeding herd. Dipped regularly from birth till put in exposure experiment.

Inoculated intrajugularly on the 9-10-24 with 10 c. cs. peptonised spleen pulp of an East Coast Fever beast.

Result.—Temperature reaction from the 20th—27th day, maximum 103·6° Fahr.; blood smears showed small piroplasms, *Gonderia mutans* type, in about 2% of red cells: gland smear negative for East Coast Fever.

Exposure to natural infection 10-1-25—20-3-25.—

Temperature reaction commenced on the 40th day, reaching 105° Fahr., on the 41st day, returning to normal on the 42nd day: from the 44th—48th day temperature again elevated, maximum 103·4° Fahr.

Smear examination.—41st day blood showed *P. bigeminum*: trypanblue injected: gland smears of the 42nd day, Koch's bodies rare.

Re-exposed to natural infection—16-7-25—27-8-25.—

Result.—Temperature reaction from the 15th—22nd day, maximum 103·8° Fahr., returning to normal on the 23rd day, and again elevated from the 26th—29th day, maximum 102·6° Fahr.

Smear examination.—Blood negative: Gland Koch's bodies rare.

Re-exposed 22-12-25—20-1-26.

Result.—No reaction.

C. 8812, *Grade*.—

History.—

Date of birth 13-7-23, the progeny of the laboratory breeding herd: dipped regularly from birth till put in exposure experiment.

Inoculated intrajugularly on the 9-10-24 with 10 c. cs. peptonised spleen pulp of an infected East Coast Fever beast.

Result.—Temperature reaction from the 17th day till the 46th day, maximum 104.4° Fahr., 44th day, when observations discontinued.

Smear examination.—20th, 21st and 23rd day, blood and gland, negative: 26th and 28th days, *Blood*, *Gonderia mutans* fairly frequent: *Gland*, no Koch's bodies seen.

Smears, Blood and Gland, were again examined on the 33rd, 41st and 44th days. Blood showed small piroplasms. Gland negative for East Coast Fever.

Exposed to natural infection 10-1-25—10-3-25.

Result.—Temperature reaction from the 35th—47th day, maximum 104.4° Fahr., 36th day.

Smear examination.—*Blood*, spirilla seen on the 36th day, *Gland*, Koch's bodies rare on the 40th day.

Re-exposed to natural infection at Waterfalls 13-3-25—11-4-25.—

Result.—Temperature showed an upward curve from the 13th—16th day and a downward from the 16th—22nd day, and an upward curve from the 23rd—28th day, and dropped to sub-normal on the 30th day, when the animal died.

Smear examination.—Smears, Spleen and Gland, collected after death showed Koch's bodies.

C. 8871, *Grade*.—

History.—

Date of birth 12-11-23, the progeny of the laboratory breeding herd. Dipped regularly from birth till put in exposure experiment; susceptible to East Coast Fever.

Inoculated intrajugularly on the 9-10-24 with 10 c. cs. peptonised spleen pulp.

Result.—Temperature reaction from the 20th—27th day.

Smear examination.—21st day, *Blood*, *Gonderia mutans* very rare.

Gland, No Koch's bodies seen.

Exposed to natural infection 10-1-25—10-3-25.—

Result.—From the 41st—50th day, temperature reaction, maximum 104° Fahr., on the 46th day.

Smear examination.—43rd and 47th day, *Blood*, small piroplasms rare. *Gland*, Koch's bodies rare.

Re-exposed to natural infection at Waterfalls 13-3-25—30-7-25.—

Result.—Temperature reaction with remissions from the 16th—33rd day.

Smear examination.—17th day, *Blood*, small piroplasms rare. *Gland*, Koch's bodies frequent.

Blood was collected on the 34th day, and inoculated to two grade cattle. No reaction resulted.

C. 9916, Grade.—

History.—

Age, about 2 years, purchased for rinderpest serum production; susceptible to East Coast Fever.

Inoculated intrajugularly on the 26-8-25, with 10 c. cs. peptonised spleen pulp.

Result.—Temperature reaction from the 13th—20th day, maximum 102° Fahr., on the 16th day.

Smear examination.—15th and 16th days, *Blood*. Negative for East Coast Fever. *Gland*. No Koch's bodies seen.

Exposed to natural infection 15-9-25—16-10-25.—

Result.—On the 21st day, temperature 102·4° Fahr.; on the 22nd day, 99·8° Fahr., temperature then showed a normal curve.

Smear examination.—21st day, *Blood*, small piroplasms rare. *Gland*, 1 Koch's body seen.

Re-exposed to natural infection.—30-11-25—9-1-26.—

Result.—Temperature reaction from the 17th—21st day : maximum 104° Fahr.

Smear examination.—19th day, *Blood.* No parasites seen.

Gland. 1 Koch's body ?

21st day, *Gland.* Koch's bodies rare, 2 seen.

C. 9765, Grade.—

History.—

Date of birth 26-5-24. Born and reared on a dairy farm in an East Coast Fever area. Stunted in growth. Immune to Redwater and Gallsickness and believed to be susceptible to East Coast Fever.

Inoculated intrajugularly with 10 c. cs. peptonised spleen pulp.

Result.—No reaction.

Re-inoculated intra-splenically on the 26-8-25 with 15 c. cs. spleen and gland pulp.

Result.—No reaction.

Exposed to natural infection 18-9-25—21-10-25.—

Result.—Temperature reaction with remissions from the 16th—26th day. Maximum 103° Fahr. 20th day.

Temperature irregular for some days after.

Smear examination.—17th day, *Blood.* No parasites seen.

Gland. 1 Koch's body ?

19th day, *Blood.* Small piroplasms scanty.

Gland. Koch's bodies rare : 1 seen.

Re-exposed to natural infection 30-11-25—22-12-25.—

Result.—On the 23rd day, temperature reaction commenced : 103·4° Fahr. Temperature returned to normal on

the 25th day. From the 28th—33rd day, temperature elevated, maximum 103·6° Fahr. and returned to normal on the 35th day.

Smear examination.—23rd day, *Blood*. No parasites seen.

Gland. Koch's body, 1 seen.

28th day, *Blood*. Small piroplasma scanty.

Gland. Koch's bodies rare, 1 seen.

29th, 30th & 31st days. *Blood*. Small piroplasms rare.

Gland. Koch's bodies.

C. 9783, *Grade*.—

History.—

Date of birth 12-8-24 : born and reared on a dairy farm in an East Coast Fever area. Stunted in growth. Immune to Red-water and Gallsickness and believed to be susceptible to East Coast Fever.

Inoculated intrajugularly on the 30-6-25, with 10 c. cs. peptonised spleen pulp.

Result.—No reaction.

Re-inoculated intravenously on the 26-9-25 with 10 c. cs. peptonised spleen pulp.

Result.—No reaction.

Exposed to natural infection 12-10-25—8-11-25.—

Result.—On the 16th day, temperature reaction commenced 103·4° Fahr. returned to normal on the 17th day. A second rise commenced on the 19th day, returning to normal on the 24th day, maximum 103·4° Fahr. on the 19th day.

Smear examination.—19th day, *Blood*. No parasites seen.

Gland. Koch's bodies : 2 seen.

Re-exposed to natural infection.—22-12-25—20-1-26.—

Result.—Temperature reaction from the 21st day, returning to normal on the 27th day, maximum 103·6° Fahr.

Smear examination.—23rd and
24th days, *Blood.* Small piroplasms rare.

Gland. Koch's bodies rare.

The following shewed a doubtful reinfection.—

C. 9324.—

History.—

Date of birth 16-9-24, progeny of laboratory breeding herd : recovered from redwater and gallsickness : inoculated intrajugularly with peptonised spleen pulp of a naturally infected East Coast Fever beast.

Result.—Indefinite temperature reaction.

Re-inoculated intrajugularly with 10 c. cs. peptonised spleen pulp soaked in 0·65% quinine hydrochloride solution for $\frac{1}{2}$ an hour.

Result.—No reaction.

Re-inoculated 19-8-25, intrasplenically with 15 c. cs. peptonised spleen pulp.

Result.—Indefinite temperature reaction.

Exposed to natural infection 8-9-25—16-10-25.—

Result.—Temperature reaction with remissions from the 39th—45th day, maximum 103° Fahr. 40th day.

Smear examination.—39th day, *Blood.* P. bigeminum rare.

39th day, *Gland.* None collected.

42th day, *Blood.* Small piroplasms rare.

42nd day, *Gland.* 2 Koch's bodies queried.

Re-exposed to natural infection 22-12-25—20-1-26.—

Result.—Temperature reaction from the 17th—22nd day, maximum 103° Fahr. on the 19th day.

Smear examination.—19th day, *Blood*. No parasites seen.

Gland. Koch's body queried.

22nd day, *Blood*. Small piroplasms rare.

Gland. 1 Koch's body seen.

C. 9764 Grade.—

History.—

Date of birth 1-4-24. Born and reared on a dairy farm in an East Coast Fever area. Stunted in growth. Immune to Red-water and gallsickness and believed to be susceptible to East Coast Fever.

Inoculated intra-splenically on the 26-8-25 with 15 c.cs peptonised spleen pulp of a naturally infected East Coast Fever beast.

Result.—Reacted to East Coast Fever from 16th-26th : maximum 104.2° Fahr, 19th day.

Exposed to natural infection 18-9-25—21-10-25.—

Result.—Temperature reaction from the 16th-26th day, maximum 104° Fahr, returning to normal on the 27th day, and rising again on the 34th day, and remaining elevated with remissions till the 48th day.

Smear examination.—18th day, *Blood*. Small piroplasms scanty.

Gland. Koch's bodies rare.

35th day, *Blood*. P. bigeminum frequent

41st day, *Blood*. 1 small piroplasm seen.

Gland. Koch's bodies rare.

Re-exposed to natural infection 10-11-25—22-12-25.—and then transferred to laboratory boma which is free of East Coast Fever.

Result.—Temperature reaction 103° Fahr on the 1-1-26, returning to normal on the following day.

Smear examination.—1-1-26, *Blood.* No parasites seen.

Gland. Koch's bodies, intracellular, rare, queried.

(b) *Non-inoculated cattle recovered from natural infection and subsequently re-exposed.*—

10 cattle varying in age from 18 months to 5 years were re-exposed, of which one again reacted to East Coast Fever when re-exposed, *viz.*—

C. 8896 *Grade.*—

History.—

Purchased as a two year old in December 1923 for rinderpest production. Born and reared in a non-infected East Coast Fever area ; believed to be susceptible to East Coast Fever.

Exposed to natural infection 16-4-24—10-5-24, at N'gong.

10-5-24—16-8-25, exposure camp
at Laboratory.

Result.—Temperature reaction commenced on the 16th day after exposure at N'gong and continued till the 35th day with a downward curve from the 28th day. Maximum 107.6° Fahr, 23rd day.

Smear examination.—9-5-24, *Gland.* Koch's bodies rare.

13-5-24, *Gland.* ,, ,, ,,

14-5-24, *Gland.* ,, ,, ,,

Re-exposed to natural infection 13-3-25—6-8-25, at Waterfalls.—

Temperature reaction from the 12th—18th day, maximum 105.6° Fahr on the 14th day.

Smear examination.—26-3-25, *Blood.* No parasites seen.

26-3-25, *Gland.* Koch's bodies frequent.

Re-exposed to natural infection 30-11-25—22-12-25.—

Result.—On the 27th day, temperature slightly elevated and on the 28th day, 102·4° Fahr, returning to normal on the 29th day.

Smear examination.—28th day, *Blood* and *Gland.* Negative.

29th day, *Gland.* 2 Koch's bodies
queried.

GENERAL SUMMARY.—

- (1) Immunisation experiments.
- (2) Exposure of non-inoculated calves.
- (3) Re-exposure experiments.

(1) *Immunisation experiments.*—

Immunisation of calves.—

Total inoculated	...	...	119.
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Total exposed	...	...	97.
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Average percentage of mortality from East Coast

Fever and complications and other causes	..	57·4%
--	----	-------

Immunisation of cattle, other than calves, recovered from Red-water and Gallsickness.

Total inoculated	...	...	37.
------------------	-----	-----	-----

Total exposed	...	...	32.
---------------	-----	-----	-----

Average percentage of mortality from East Coast

Fever and complications and other causes	...	25·5%
--	-----	-------

Immunisation of cattle, other than calves, not recovered from Redwater and Gallsickness.

Total inoculated	...	...	20.
Total exposed	...	...	17.
Average percentage of mortality from East Coast Fever	...	...	5%
Percentage of mortality from Anaplasmosis, Redwater and Spirillosis, unassociated with East Coast Fever, produced by inoculation or contracted on exposure	...	...	25%

(2) *Exposure of non-inoculated weaned calves to natural infection.*—

Total exposed	...	...	10.
Percentage of mortality from East Coast Fever and complications	...	...	90%

Exposure of non-inoculated unweaned calves, running with their mothers, to natural infection.—

Total exposed	...	...	4.
Percentage of mortality from East Coast Fever	..		75%
Percentage of mortality from Redwater which occurred after the termination of the East Coast Fever reaction	...	...	25%

(3) *Re-exposure experiments.*—

Of 86 cattle which were *inoculated* for East Coast Fever and then exposed, at varying intervals after, to natural infection and subsequently re-exposed, reinfection with East Coast Fever occurred on re-exposure in six, one of which died from East Coast Fever, and a doubtful reinfection was recorded in two instances.

Of a total of 10 non-inoculated cattle which had reacted to East Coast Fever, on exposure, reinfection occurred in one on re-exposure.

The method of immunisation employed was as follows, *viz.*—

The intrajuglar or intrasplenic inoculation of peptonised spleen pulp, with or without soaking in 0.65% quinine hydrochloride solution for half an hour, of an infected East Coast Fever beast and subsequent exposure of inoculated animals in a highly infected Camp, to natural infection to complete the immunisation process, which, in some instances as shewn above, was not complete after one exposure.

The intrajugular is the simpler method. More satisfactory results were obtained from the immunisation of cattle, *other than calves*, which had previously recovered from redwater and gallsickness. The inoculation of cattle not recovered from redwater and gallsickness was unsatisfactory owing to the transmission, when the material used for inoculation is obtained from a recovered redwater-gallsickness beast, of these infections which may co-exist with or be superimposed on the East Coast Fever reaction produced by inoculation or occurring from natural infection when the cattle are exposed. The reaction to East Coast Fever on exposure was frequently responsible for a recurrence of redwater and spirillosis, the recurrence of anaplasmosis was exceptional, in cattle which have recovered from these infections and was responsible for an increase in the death rate, *particularly in calves*.

The best results in field immunisation are anticipated in cattle, other than calves, which have recovered from redwater and gallsickness provided they are in a suitable condition and the grazing is good and immunisation is carried out at centres under Veterinary supervision.

A herd of cattle of various ages definitely known to have reacted to East Coast Fever, natural infection, are available for further re-exposure experiments.

STERILITY IN CATTLE.

The genital organs, collected at time of slaughter, of 68 cows and heifers varying in age from about $3\frac{1}{2}$ years and upwards were brought to the Laboratory for examination.

Their history showed that they were non-breeders or irregular breeders, and for this reason were disposed of to a local butchery for slaughter.

60 of these animals came from one Estate, the remainder from another.

The findings were as follows, *viz.*—

70% were non-pregnant, the remainder, 29% approximately, pregnant.

The pathological-anatomical findings in non-pregnant animals varied and included the following *viz.*—

Salpingitis, Cystic ovaries, persistent corpora lutea, adherent oviducts pyometra, metritis, peritonitis, cervicitis, vaginitis, atrophied ovaries, the four former being the commoner.

Agglutination tests were made of 16 non-pregnant and six pregnant animals.

37% approximately, of the former were positive for contagious abortion, while none of the latter were positive.

MORTALITY AMONG CALVES.

It has been brought to the notice of the laboratory that what appears to be an excessively high mortality of calves frequently obtains in dairy herds. Almost all the losses occur in animals of from one month to three months old, and it is not uncommon to find that in a large boma of unweaned calves as many as 25% of the total calves in the boma die during the course of one month: since the calves normally remain in the boma for about five months, it may be assumed that at any time some 40% of them are of the susceptible age, *i. e.* between one and three months. The death of 25% of the total number of calves in a boma may accordingly be taken as representing a loss of, approximately 62% of the susceptible animals.

It appeared significant that the age at which death generally occurred coincided roughly with the period at which it is usual for animals to react to natural infection with *Anaplasma marginale* or redwater when exposed to tick infection. Numerous blood smears were examined from sick and dead animals and the presence of *Anaplasma marginale* and *P. bigeminum* was determined in a certain proportion of cases. The evidence was, however, not considered as definitely indicating the culpability of either infections and it was arranged that one Estate should undertake vaccination of calves with redwater-gallsickness vaccine, keeping careful records of the results. After a trial of some six months, it appears that vaccination has not greatly influenced the incidence of mortality.

When the results of smear examinations of dead calves were tabulated, it was found that of 41 smears from unvaccinated animals on the farm in question, *six* shewed numerous anaplasms and *five* shewed occasional parasites, and, in some instances, *P. bigeminum* was present. Of a total of nineteen gallsickness vaccinated calves examined, none shewed the presence of blood parasites at death. It was evident, therefore, that some condition other than Anaplasmosis or Redwater was concerned in and perhaps primarily responsible for the deaths of these animals, and the Assistant Chief Veterinary Research Officer was detailed to investigate.

The lesions found on post-mortem examination of a number of calves subsequently obtained from this farm appeared to be fairly constant. The most typical lesion appears to be an inflammation of the last portion of the small intestine and of the mesenteric glands in that region, while an enlarged spleen and consolidation of the posterior lobes of the lung are also common features. Occasionally infarcts are observed in the liver. In animals that have been sick some time before death the small air-passages of the posterior part of the lung frequently contain a purulent exudate and there is a patchy necrosis of the surrounding tissues.

Cultural examination of the intestines and organs of these calves revealed the presence in every case of an organism of the Paratyphoid-Gaertner group.

The characters of the bacillus isolated were very constant.

It does not retain the stain by Gram's method, is motile and ferments the following sugars with the production of acid and gas, *viz.*, Dextrose, Maltose, Laevulose, Galactose, Mannose, Rhamnose, Arabinose, Mannite, Dulcite, Sorbite. It does not ferment Lactose, Saccharose, Adonite, Raffinose, Erythrite, Inosite, Dextrin, Salycin, Inulin or Xylose. Litmus milk is at first slightly acid and finally strongly alkaline.

Various methods of diagnosis were applied to sick calves with the following results :—

- (1) Out of a total of **five** calves which had been sick for periods of two days or less the bacillus was cultivated in **three** cases directly from blood drawn from the jugular vein during life.
- (2) Of **seven** cases in which the disease had been established for some little time, the blood of **five** calves agglutinated the paratyphoid bacillus in dilutions varying from 1—800 to 1—2,500.
- (3) Cultivation of the bacillus from faeces during life was successful in **six** out of **fourteen** cases.
- (4) From **eleven** cases on which post-mortem examinations were made, the organism was cultivated from the gut and organs in every case.

Smear examination of **seventeen** sick or dead calves gave negative results in **twelve** cases. Of **five** cases in which blood parasites were present, **four** shewed Anaplasmas. The history of these **four** animals is tabulated hereafter:—

Calf No.	History.	Cultivation of faeces during life.	Smear examination during life.	Agglutination.	P.M. cultivation.
X 414.	Arrived at the laboratory 2-1-26, having been sick prior to 22-12-25. Very weak. Mucus with faeces. Lesions in lungs. Died 13-1-26.	Paratyphoid bacilli isolated 4-1-26.	N.P.S. daily until 8-1-26. <i>Anap</i> : <i>marginale</i> daily, from 8-1-26 to 13-1-26. <i>Spironema</i> , 12-1-26 & 13-1-26.	No test made.	Paratyphoid bacilli cultivated from gut, gland & all organs.
9.	Living calf. Aged 3 months, at time of examination, had been sick for 3 weeks: Anaemia.	Negative for Paratyphoid.	<i>Anap</i> : <i>marginale</i> , heavy infection, but obviously of recent origin since no blood changes were present.	Positive 1 in 2,000.	Recovered.
.	Sick 3 weeks (Anaemic at time of examination).	Negative for Paratyphoid.	<i>Anap</i> : <i>centrale</i> , heavy infection, marked blood changes.	Negative.	Recovered.
X 374.	Living calf. Aged 3 months. Arrived at the laboratory 15-12-25. Had been vaccinated for gallsickness at 1 week old. Died 17-1-26.	Paratyphoid bacilli isolated 15-12-25.	<i>Anap</i> : <i>centrale</i> , heavy infection, marked blood changes 15-12-25. Later, <i>Anap</i> : <i>centrale</i> very rare. At death, no Anaplasma, but a few small piroplasm.	Positive 1 in 2,000 15-12-25.	Paratyphoid bacilli cultivated from gut, gland & all organs.

In the case of calf X414, it appears that an attack of Anaplasmosis supervening on a chronic paratyphoid infection was sufficient to bring about death rapidly. In the case of Calf 9, the history of three weeks illness, and the agglutination titre of 1-2,000, together with the absence of anaemic changes in the blood indicate that the paratyphoid infection was primary and the *Anaplasma* secondary. Calf X374, may be considered as having passed through a reaction to *Anaplasma centrale* vaccination during an attack of paratyphoid, probably without affecting the ultimate course of the latter disease. The illness of Calf 1, appears to have been a simple reaction to *Anaplasma centrale* vaccination.

It will be obvious that a calf weakened by two or three weeks illness due to paratyphoid infection can possess very little vitality to withstand a natural Anaplasmosis infection. The influence of the combined infections is a subject requiring particular attention when the question of artificial immunisation is considered.

It is necessary also to give careful consideration to the conditions under which dairying is carried out in this country, more particularly, since paratyphoid is generally regarded as occurring sporadically rather than as an extensive enzootic. Certain German workers have expressed the opinion that such factors as long train journeys or long trekking have a marked influence on paratyphoid infection. Similarly, it has been established both clinically and experimentally that prolonged fasting of calves or lambs favours the chances of infection with paratyphoid bacilli.

The system usually in force in Kenya is to keep young calves apart from their mothers some ten or twelve hours out of the twentyfour. The mothers are milked after the period apart from the calves and the calves are then allowed to suck. On certain estates the calves are with their mothers during the night and separated during the day, either remaining in a boma during the whole twentyfour hours or being herded away from their mothers during the daytime. On other farms the calves remain with their mothers on the pasture during the daytime and are separated in bomas during the night. Under either system there are two factors predisposing towards bacterial infection of the gut, *viz*, the daily or a nightly fast of some ten to twelve hours and the concentration of calves in a limited area which is certain eventually to become thoroughly contaminated with intestinal bacteria.

It is known that on one estate infection occurred in calves whose mothers were never separated for milking. It was the practice here to collect the cows and calves nightly in a boma. When the system was changed to allow the animals to remain out at pasture during both night and day, the epizootic ceased.

Experiments are now in hand to ascertain the possibilities of vaccination with a killed vaccine soon after birth. It is possible also that a hyperimmune serum may be of value in the prophylaxis of infection. The relationship of this infection to the mortality from Anaplasmosis and Redwater is also receiving consideration.

In any event it is certain that any attention given to the improvement of methods in calf rearing, will produce a subsequent fall in the incidence of bacterial infections.

A separate report will be issued when investigations of this disease are more complete.

SHEEP DISEASES.

On different occasions, owners in the Laikipia district reported a mortality in sheep, and forwarded specimens of lungs collected from sick or dead sheep.

On examination, lesions were found which pointed to a specific infection, and it was decided to make a preliminary field investigation.

At the urgent request of the Chairman of the Mount Kenya Stockbreeders' Society, a research officer was detailed, in December, to investigate "in loco" and collect material.

The result of the preliminary investigation shewed that an affection occurs in sheep on a number of farms in the Laikipia District and which is responsible for serious losses.

In some instances, on post-mortem examination, a Pleuropneumonia fibrinosa with sometimes putrefactive changes was recorded; in other no pathogenic changes were present in the lungs: the latter shewed an acute conjunctivitis and a stomatitis, both conditions were observed in the same outbreak. On careful examination for the existence or otherwise of sheep-pox in one of the affected flocks, no skin lesions of sheep-pox were found. Affected sheep were tested on their immunity to sheep-pox, after arrival at the laboratory, with negative results, consequently sheep-pox had to be excluded.

Sheep of various ages, including lambs, were found affected : cases are said to occur throughout the year. Fourteen sick sheep were collected and brought to the laboratory for further research work : in addition, pathological specimens were collected.

Bacteriological examination and cultures of material from affected lungs were made, resulting in the detection and isolation of several organisms, with which transmission experiments are being carried out to determine their pathogenicity.

EAST AFRICAN SWINE FEVER.

PREPARATION OF ANTI-SERUM.—

The difficulties hitherto experienced in connection with the preparation of an anti-serum has been in obtaining immune and hyperimmune pigs ; the few pigs which did react and recover to the inoculation of a virulent dose of virus died when large doses were injected with a view to hyperimmunising.

Attention was then given to the possibility of immunising pigs with an attenuated virus ; the results are promising : attempts at attenuation by passage of virus through Guinea-pigs and rabbits were unsuccessful. Blood collected from inoculated Guinea-pigs and rabbits did not produce Swine Fever. Blood collected from pigs inoculated with blood of inoculated Guinea-pigs and rabbits did not produce Swine Fever.

The probability of *Hæmatopinus suis* being carriers of Swine Fever was investigated : of a total of *nine* pigs put in experiment and infested with parasites collected from reacting pigs, *seven* survived and *two* died of Swine Fever. In the latter, infection was probably conveyed through attendants.

Careful microscopic examination of blood of pigs reacting to Swine Fever shewed no visible infection.

Blood of infected pigs produced no growth in beef bouillon and agar media.

PARASITIC WORMS.

A thorough investigation of the helminths parasitic in domestic animals in Kenya, and more particularly in sheep and young cattle, is undoubtedly a matter of prime importance to the stock-raising industry.

In the first place, there are to date very few records of the parasitic round-worms of domesticated animals from Central, East and South Africa, beyond those of the common larger forms such as the wireworm or stomach-worm, *Haemonchus contortus*, the nodular worms, *Oesophagostomum* spp., and more recently the hookworms, *Bunostomum* spp. Every opportunity to collect worms has, therefore, been taken since the Assistant Chief Veterinary Research Officer's arrival in the country and several interesting records of species can already be made.

It will be recalled that in South Africa great attention has been for many years paid to the prevention of heavy infestation with *Haemonchus*. The evolution of the successful periodic treatment with copper sulphate and arsenic is an outcome of the intensive study of this species. More recently, nodular worm, which has long been considered a serious problem in the United States, has been cited as the cause of extensive losses of lambs in South Africa. In Europe, it has been recognised for many years that extremely heavy losses of lambs, chiefly from about 5 months to one year old, can be occasioned by heavy infestation with small trichostrongyles belonging to the genera *Ostertagia* and *Trichostrongylus*. In fact it was the Assistant Chief Veterinary Research Officer's experience in England that one species of *Ostertagia*, *O. circumcincta* (Stadelmann, 1894) was probably responsible for more losses among lambs than all the rest of the round-worm parasites taken together. Up to the time of the present investigation there were no records of the collection of this parasite from sheep in Africa, but it has recently been collected in large numbers from the stomach of lambs in Kenya. Considerable care may, therefore, be needed in certain districts to prevent the occurrence of periodic losses from this parasite during particularly wet seasons. Various species of *Trichostrongylus*, including species known to cause mortality in Europe, have also been collected, some in large numbers, from sheep and cattle in Kenya. The individual species are recorded below, but it may be well to make some remarks here particularly on the subject of collection of such parasites, for the benefit of owners desiring to forward specimens to the laboratory for determination. In the first place, most of the members of the trichostrongyle group are so small that they easily escape observation during a post-mortem examination unless some special technique is employed for collection.

The following method of collection is quite satisfactory :—

The 4th stomach and the small and large intestine are opened, the intestine with scissors. In the case of the stomach and the large intestine, if a considerable quantity of food material is present, this is roughly everted. The stomach, with the food

material that adheres to the mucous membrane, is now washed in a large jar of water until the mucous membrane is quite clean and free from the smallest particles of foreign material. After being examined by transmitted light to ascertain if cysts are present in the mucous membrane, the stomach itself is discarded and the material in the jar is allowed to sediment for a few moments. The supernatant fluid is then decanted and the jar again filled with water and allowed to sediment. This process of washing is repeated until the water remains fairly clean. The parasites and food material remaining at the bottom of the jar after the last washing are collected in a specimen tube or jar containing an excess of 10% formalin solution or preferably absolute alcohol. The small intestine is first detached from the mesentery and freed from kinks: it is next opened with a pair of scissors into a jar of water. Finally the parasites and the food material in close contact with the mucous membrane are freed by running the opened intestine between the finger and thumb and washing off the material so collected. The material is sedimented in the same way as that from the stomach and the parasites are collected. The large intestine is treated in a similar manner. Many of the smaller *trichostrongyles* are still not readily seen, even after the washing, without the use of hand-lens and it is more particularly to the collection of such parasites that this technique is directed.

With the exceptions of the liver-flukes which are considered later, the more important parasites of domesticated ruminants consist entirely of round-worms of the superfamily *Strongyloidea*. The life-histories of all the members of this group are essentially similar, differing only in detail. General measures can, therefore, be formulated from our knowledge of the life-history for the prevention of infestation by all or any of them. The following brief notes may be of interest. The eggs of these parasites pass out with the faeces and, after a varying period of development under favourable conditions, hatch, liberating a first-stage larva which soon undergoes a moult entailing certain structural alterations.

The second-stage larva so produced again moults after a short period of development and becomes the third-stage larva or infective form.

Frequently the second moult is not completed, the old cuticle of the second-stage larva becoming everywhere detached but remaining unbroken. This additional cuticle forms an envelope or sheath enabling the infective larva to survive a certain degree of desiccation. The infective larva does not feed but draws its energy from the consumption of food granules stored in the cells of the intestinal wall. The general features of this life-history are common to all the members of

the *Strongyloidea*. There are frequently, however, features of development that are peculiar to certain species, and some of these might be mentioned here :—

(1). In the case of certain species one or both moults can take place within the egg, prior to hatching. (2). As a general rule it may be taken that the larvae of the first and second stages require food for growth, but the larvae of certain species do not feed. (3). The larvae of the third or infective stage of many species exhibit the character of climbing during the night or on cloudy days. They will ascend convenient blades of grass or even the glass walls of a jar, provided a certain amount of moisture is present. Direct sunlight causes them to retreat as rapidly as possible to the ground.

None of the larvae can support themselves in water or climb solid objects from water, and, since the indications are that beyond a depth of about $\frac{1}{4}$ " of water eggs and larvae are unable to obtain sufficient air to carry on their development, it follows that the popular conception of the danger of drinking ponds is misplaced. At the same time the rich pasture surrounding such ponds or pools may quite feasibly be dangerous as conditions there are ideal for development of larvae and the unusual richness of the pasture tempts animals to graze.

The degree of resistance possessed by larvae to drying varies with different species and with the larvae of different stages, but it can be stated that generally first and second stage larvae possess little or no resistance to desiccation, while the infective larvae all manifest greater powers of resistance than the earlier stages. With regard to cold, the position is somewhat similar, although the third stage larvae of some species cannot survive temperatures below freezing point.

Infection in the case of those species that parasitise ruminants, takes place as a rule, by the mouth only. In certain cases *e.g.*, that of the hookworms, the indications are that after infection the larvae may migrate from the alimentary canal by way of the blood vessels to the liver and lungs and thence to the larger air passages and trachea, finally reaching the pharynx, where they are again swallowed, this time developing to maturity in the gut. The larvae of other species *e.g.*, *Ostertagia spp.*, *Oesophagostomum spp.*, penetrate the wall of the stomach or intestine and encyst soon after infection has taken place. They remain in that site for some time, eventually leaving the cysts as almost mature adults.

It must be emphasised that the chief danger from roundworms is to young stock, lambs and calves, and it is to safeguarding of the young stock that preventive measures are chiefly directed. Fortunately, it is not necessary entirely to prevent

infection, but only so to reduce the chances of infection that infestation is maintained at a harmless low level. The main points to be remembered are that the drying power of the sun is a great factor in the destruction of developing eggs and larvæ, that older animals will frequently tolerate a degree of infestation that would prove fatal to young lambs or calves and that eggs when voided from the intestine of an infected animal take upwards of a week to develop into infective larvæ.

Suitable preventive measures vary with the particular conditions of stock-raising in different countries, but whatever the measures taken they must be based on the cardinal facts cited above. It may safely be stated that whenever heavy infestation is known to be a possibility it is a matter of prime importance to reserve the cleanest land for young stock, and to take reasonable precautions to ensure that they do not run the risk of heavy infection from contact direct or otherwise with older animals.

Having regard to the dry conditions prevailing in many of the sheep-rearing districts of Kenya and also to the sparse distribution of sheep on the land, it should not be difficult to control parasitic infection.

When further experience of local conditions has been gained the laboratory will be able to issue general advice to stock-owners on the measures to be adopted. At the present time each individual outbreak must be carefully investigated on its own merits.

The question is frequently raised as to the part played by game in the dissemination of infection among sheep and cattle. It will be seen from the notes made in the records of species that various species of buck, antelope, gazelle and deer, have been recorded as hosts of some of these forms. It will also be evident that such game can only become a factor in the infection of domesticated animals when they are sufficiently numerous in small areas to contaminate grazing badly. The laboratory, however, would be grateful for specimens collected from game in the manner already indicated and would supply containers on request.

It is frequently asked if zebra which are known to be heavily parasitised are dangerous on this account to sheep and cattle. The answer is in the negative: the parasites of zebra are largely transmissible to other equines, but not to ruminants.

Records of Parasites collected from Domestic Ruminants.

Superfamily,...Strongyloidea...Weinland, 1858

Family,Strongylidae ...Baird,1853

Subfamily,.....Necatorinae ...Lane,1917

Genus, *Bunostomum* Railliet, 1902. (Hookworms).

Bunostomum trigonocephalum (Rudolphi, 1808). This is the common hookworm of sheep. It inhabits the small intestine and feeds by puncturing the small vessels of the mucosa to obtain blood. The worms are roughly from half-an-inch to one inch in length and about one-fiftieth-of-an-inch in thickness. They are thus readily seen by the naked eye when suitable methods are employed for collection. When present in lambs in large numbers they produce emaciation and anaemia. Dropsical swellings appear under the jaw and chest in heavily infested lambs. The lambs shew occasional attacks of diarrhoea and die in a condition of extreme debility. Those heavily infested lambs that survive for some considerable time do not make a normal growth and are often so stunted that they appear to be only half their actual age. In chronic cases the lambs are frequently so anaemic that the membranes of the eye and mouth are as completely blanched as they are in heavy liver-fluke infestation.

This parasite has been collected in varying numbers from sheep and lambs during the past six months. Observations have been made on one heavily infected flock of lambs where upwards of 200 lambs have died out of a lambing of about 800. The outbreak occurred in rather a damp district at an altitude of over 9,000 ft. The animals were Grade Romney Marsh of good quality. Lambing in this instance took place in May, although the usual period for lambing in the district is October. Deaths commenced to occur when the lambs were about 4 months old and continued for about 5 months, the worst period being from 4 to 7 months. At 8 months old many of the surviving lambs were not so large as other lambs on the same farm which were then between 3 and 4 months old.

The life-history of this parasite is a direct one. The eggs hatch in the faeces and larvae undergo the usual two moults. Under normal conditions, development may be expected to require about 5 days. The infective larvae do not climb the walls of the vessels or blades of grass and apparently infection through unbroken skin does not take place. It is probable, however, that once in the stomach or small intestine the larvae penetrate the mucous membrane and so travel by the blood stream to the lungs, returning to the gut by way of the trachea and pharynx.

This parasite has been frequently observed as a factor in heavy losses in Great Britain, combined on various occasions with lungworms, stomach-worms and small tricho strongyles. The known hosts of this species include, sheep (*Ovis aries*), goat (*Capra hircus*), chamois (*Rupicapra rupicapra*).

The general remarks already made on the subject of preventing infestation apply to this parasite.

So far as anthelmintic treatment is concerned the position is at present somewhat more difficult. The known hookworm remedies in approximate order of efficacy are Tetrachlorethylene, Carbon Tetrachloride, Oil of Chenopodium and Thymol, but the data concerning treatment have largely been derived from experiments on dogs and man. Thymol apparently is of little value in the treatment of hookworm in ruminants. Oil of Chenopodium, in the hands of the Assistant Chief Veterinary Research Officer, has proved of great value in the control of outbreaks in England, but it is extremely expensive. Carbon tetrachloride has also been used with some success, but the great objection to the administration to ruminants of this drug and also Tetrachlorethylene, is their great volatility.

Experiments are now being made on the treatment of hookworm in sheep by various Chlorine derivatives and the results will be published when available.

Bunostomum phlebotomum (Railliet, 1900). This is the cattle hookworm. In appearance and size it is similar to the sheep hookworm, and the observations regarding life-history and the symptoms caused by heavy infestation of that species apply in general to the cattle hookworm. It has been collected on numerous occasions from cattle in Kenya and, in one case, has been considered as responsible, together with the liver-fluke *Fasciola gigantica*, for losses in young adult cattle. The remarks made on the subject of prevention and treatment of hookworm in sheep apply equally to this parasite.

This species has been recorded from the following hosts, cattle (*Bos taurus*) zebu (*Bos indicus*).

Subfamily,.....*Oesophagostominae* ... Railliet, 1925.

Genus,.....*Oesophagostomum* ... Molin,...1861.

Oesophagostomum columbianum (Curtice, 1890).

(Nodular worm in sheep).

This parasite is well known on account of the nodules produced in the intestine by the developing larvae. The life-history is direct and the larvae after reaching the intestine penetrate the wall and form cysts which later may become as large as a common pea. When the larvae are nearly mature they leave the wall of the gut and develop as adults in the lumen of the large intestine. The adult worms are almost as large as the hookworms and are, therefore easily seen with the naked eye. The penetration of the larvae into

the wall of the intestine is responsible, where heavy infestation occurs, for the so-called "Nodular disease," which has received considerable attention in the United States, and more recently in South Africa. No satisfactory anthelmintic treatment has yet been devised and preventive measures are those generally applicable to strongyles with a direct life-history. This species has been recorded from sheep and goats.

Oesophagostomum radiatum (Rudolphi, 1803).

(Nodular worm of cattle).

This species is similar to *O. columbianum* and the remarks made concerning that form apply equally to *O. radiatum* except that it is doubtful if any loss can be attributed to the presence of this parasite in cattle. The nodules are usually in the small intestine.

Family, Trichostrongylidae. Leiper, 1912.

Subfamily, Trichostrongylinae. Leiper, 1908.

Genus, *Haemonchus*. Cobb, 1898.

Haemonchus contortus (Rudolphi, 1803).

(Wireworm or Stomach-worm).

This species has been collected on numerous occasions from cattle and sheep. Its appearance, life-history, and the necessary treatment are so well known as to need no recapitulation. It appears to be a factor in losses of yearling calves in this country, and probably is responsible for much retarded development in moderately infested yearlings.

Examinations of periodically treated sheep and lambs confirm the efficacy of the remedy issued by the department in maintaining infestation at a minimal level. This species has been recorded from numerous wild ruminants in various parts of the world and, no doubt, is present in many of the wild ruminants of East Africa.

Genus *Trichostrongylus* Looss, 1905.

The members of this genus are all extremely small forms and the special technique required for their demonstration at post-mortem examination has already been considered. Their usual site of election is the duodenum or first portion of the small intestine, and less commonly the stomach. During life they are red-coloured, apparently on account of their blood-sucking habit. There is probably nothing unusual in their life-cycle and they do not appear to form cysts or migrate during the first part of their parasitic life.

Trichostrongylus colubriformis (Giles, 1892).

Synonym.....*T. instabilis* (Railliet, 1893).

This species has been collected, at times in large numbers, from sheep and cattle in Kenya. The forms from cattle showed some variation from the accepted characters of the parasite as collected from sheep, but it has been decided finally that they must be referred to the same species. *T. colubriformis* has been found in large numbers associated with *T. extenuatus* in gastro-enteritis of goats by Ransom in the United States of America and by Daubney in England. It may possibly prove to be an important parasite of sheep and calves in Kenya. It has recently been cited as producing gastro-enteritis of sheep in South Africa. This species has previously been recorded from sheep, goats, camel, man, various gazelle, deer and antelope. This is apparently the first record of this parasite in cattle.

Trichostrongylus probolurus (Railliet, 1893).

This form has been collected from sheep in varying numbers in Kenya.

Its recorded hosts include sheep, gazelle, man and camel.

Trichostrongylus extenuatus (Railliet, 1898).

T. extenuatus has been collected on numerous occasions from cattle and sheep in Kenya. It has been associated by M'Fadyean and by Daubney in England with the causation of outbreaks of gastro-enteritis in calves.

Trichostrongylus sp. Nov.

An undescribed species of *Trichostrongylus* has been collected on four occasions, once in large numbers, from sheep in Kenya. Its importance as a pathogen is not known. A description of this species is being published elsewhere.

Ostertagia Ransom, 1907.

Two members of this genus have been associated with losses of calves and sheep, respectively, in Europe and the United States. Reference has already been made to *O. circumcincta* in sheep. The other species *O. ostertagi* is frequently collected from calves in Europe and the United States and when present in large numbers causes a typical parasitic gastro-enteritis, most commonly in yearling calves. Up to the present, the only member of the genus collected in Kenya is *O. circumcincta*. These forms are blood-suckers and the problem of anthelmintic treatment is a difficult one. The Assistant Chief Veterinary Research Officer has had some success in the treatment of both species with

Carbontetrachloride and Stovarsol, but further experiments are needed in this direction. The larval stages of the species of *Ostertagia* develop in cysts in the mucosa of the stomach.

Ostertagia circumcincta (Stadelmann, 1894).

This parasite was present, in certain cases in large numbers, in the 4th stomach of sheep which were heavily infested with hookworms. It has been considered the cause of extensive losses in the wetter areas of England by M'Fadyean and by Daubney.

This is apparently the first record of the species from Africa. It has been recorded from sheep, goats, caribou, and the prong-horned antelope. The distribution of this parasite among Kenya sheep and the question of suitable anthelmintic treatment are matters that must receive further attention.

Genus *Cooperia* Ransom, 1907.

Two species of this genus have been collected up to the present in Kenya. Up to date none of the species of the genus has been considered pathogenic.

Cooperia punctata (Linstow, 1907).

This species has been collected on numerous occasions from the 4th stomach and small intestine of cattle in Kenya.

Cooperia pectinata (Ransom, 1907).

This form has been collected from the 4th stomach of nearly all the cattle examined, and less frequently from the small intestine. The specimens collected appear to fall into two races distinguished by the length of their spicules.

The interest of this record lies in the fact that the species has been collected only once previously and that in 1900 in Texas, when a few specimens were obtained by Stiles from the stomach of a Texas cow.

Superfamily, Trichuroidea.

Family, Trichuridæ Railliet, 1915.

Genus, *Trichuris* Roederer, 1761.

Trichuris ovis (Abildgaard, 1795).

This species has frequently been collected from the cæcum of sheep and cattle in Kenya. It does not appear to produce any ill-effects.

Trematoda (Flukes).

Fasciolidæ Railliet, 1895.

Fasciola Linnæus, 1755.

The only member of this genus collected is the large cattle fluke *Fasciola gigantica*. The liver fluke of sheep *Fasciola hepatica* (Linnæus) has, so far, not been seen in Kenya, although it may possibly occur in certain districts.

Fasciola gigantica (Cobbold, 1856).

This is an extremely common parasite of cattle in this country. It has been recorded as the cause of death in cattle of all ages, during the past six months. Diagnosis presents no difficulties and extract of male-fern should prove an efficacious anthelmintic. Investigation as to the prevalence of losses from this parasite and as to the particular species of snail that serves as intermediate host will be made as an opportunity arises.

Family Paramphistomidæ Fischæder, 1901.

Paramphistomum cervi (Schränk, 1790)

This common species has frequently been collected from the rumen of cattle and sheep. It does not appear to produce any pathogenic condition.

Cestoda (Tapeworms).

Family Anoplocephalidæ Khodlodkhowsky 1902.

Genus *Moniezia* R. Blanchard, 1911.*Moniezia expansa* (Rudolphi, 1810).

This species, the common tapeworm of sheep has been collected on numerous occasions from lambs. It rarely causes noticeable symptoms in affected sheep.

Extract of male-fern is a suitable anthelmintic and the wireworm remedy will also control infestation.

Stilesia hepatica (Wollffhügel, 1913).

This appears to be the common tapeworm of the liver of lambs. It does not appear to produce symptoms as a rule, although it might quite possibly do so if present in excessively large numbers.

LARVAL CESTODA.

Cysticercus bovis (Cobbold, 1866).

This parasite, the larval stage of *Taenia saginata* of man occurs fairly frequently in the muscles of cattle in Kenya. Its chief importance is as a parasite of man. Thorough cooking of beef will destroy the cysts, as will also the prolonged low temperatures necessitated by refrigeration and chilling for export.

Cysticercus tenuicollis (Rudolphi, 1810).

This larval tapeworm of which '*T. hydatigena*' of the dog is the adult stage, is fairly common in cattle, sheep and swine, as cysts free in the abdominal cavity or attached to the liver or mesentery. It has been collected once from between the meninges of the brain of a calf at Kabete. Occasionally very heavy infections of the liver may produce death in pigs.

PARASITIC WORMS FROM PIGS.

Superfamily,	Ascaroidea,	Railliet and Henry, 1915.
Family,	Ascaridæ,	Cobbold, 1862.
Subfamily,	Ascarinæ,	Travassos, 1913.
Genus,	<i>Ascaris</i> ,	Linnæus, 1758.

Ascaris lumbricoides (Linnæus, 1758).

This important parasite of man and the pig has been collected on numerous occasions from pigs at the Laboratory. In one instance, it was diagnosed as the cause of death among heavily infected young pigs. The symptoms and post-mortem findings were those usual in cases of heavy infestation with the parasite. The larvæ of this worm migrate after reaching the gut and traverse the lungs in the manner already described in connection with the life-history of certain of the Strongyles. When heavy infection of young pigs occurs during the first few weeks of life, a typical condition of chronic pneumonia and general unthriftiness is produced. The young pigs remain extremely stunted after such an attack and it is advisable to destroy them. The system originated in the United States of America by Ransom and his colleagues for the control of this parasite has proved most successful in America, and more recently, in the hands of the Assistant Chief Veterinary Research Officer, when in England.

Considerable divergence of opinion has arisen as to whether the worms from the pig and those from man belong to the same species, and if so, whether cross-infection is possible.



Scott Agricultural Laboratories.
(For Chemistry, Entomology, Mycology & Plant-Breeding).

Through the courtesy of the Medical Officer, i/c Native Hospital, Nairobi, it has been possible to obtain specimens from man and experimental cross-infection to pigs is being attempted.

Superfamily,	Spiruroidea,	Railliet & Henry, 1915.
Family,	Spiruridae,	Oerly, 1885.
Subfamily,	Arduenninae,	Railliet & Henry, 1911.
Genus,	<i>Arduenna</i> ,	Railliet & Henry, 1911.

Arduenna strongylina (Rudolphi, 1819.)

This parasite has been collected on numerous occasions from the stomach of pigs. It appears to encourage an excessive deposit of mucus on the surface of the mucons membrane, similar to that seen in infection with *Hyoststrongylus rubidus*. It is possible that heavy infestations would produce lesions and symptoms resembling those caused by that parasite, viz, persistent vomition and muco-gastritis. The parasite requires one of the dung-beetles (*Aphodius spp*) as intermediary host.

Superfamily,	Trichuroidea.	
Family,	Trichuridae,	Railliet, 1915.
Genus	<i>Trichuris</i> ,	Roederer, 1761.

Trichuris suis (Schrank, 1788).

This species is of common occurrence in the caecum of pigs. When present in large numbers it causes a local inflammation of the mucosa, which may constitute a suitable portal of entry for pathogenic bacteria present in the gut.

DISEASES OF AVIANS.

The identity of Kikuyu Fowl Disease and Fowl Typhoid.—

So-called fowl typhoid is an extremely widespread disease among flocks in Europe and America.

As early as 1895, Moore recorded the finding of a specific bacillus in connection with outbreaks of fowl typhoid in the United States. Since that time, three other types of organism have been associated by various workers with the causation of

fowl typhoid. All the organisms in question fall into the genus *Eberthella*, Castellani & Chalmers, the type species of which is *E. typhi* (Eberth), the causal organism of typhoid fever of man.

Since the appearance and cultural characters of the organisms obtained from cases of Kikuyu Fowl Disease suggested that they belonged to the genus *Eberthella*, it seemed not unlikely that the bacilli would prove to be identical with one or more species already recorded from Fowl Typhoid: this proved to be the case. The records of the laboratory indicate that at least two species of bacilli have been isolated from outbreaks of so-called Kikuyu Fowl Disease. One of these organisms is identical with *E. sanguinaria* (Moore, 1895), the first organism to be described in connection with fowl typhoid, and the other appears to be *E. rettgeri* (Hadley, 1918).

Since the investigation was commenced, a considerable number of strains have been isolated from various outbreaks in Kenya and in each case the organism in question has proved to be *E. sanguinaria*. This is also the species at present used as the vaccine strain by the laboratory and up to the present, vaccination with this species appears to have been highly efficacious in preventing outbreaks in the field. In the event of any of the other species being isolated in the future from outbreaks of fowl typhoid in Kenya, it would be necessary, of course, to incorporate these additional species in the vaccine issued.

It is of interest to note in passing that it has been remarked frequently that native fowls are considerably more susceptible to this disease than are stock of European blood. Doubtless the disease was introduced with imported stock, since "carriers" are not uncommon in European flocks and it may be supposed that European and American birds possess some degree of added resistance as a result of the long existence of the disease in those countries.

I have the honour to be,

Sir,

Your obedient Servant,

J. WALKER.

Chief Veterinary Research Officer.

APPENDIX "E".

REPORT OF AGRICULTURAL CHEMIST.

STAFF.

The staff of the Division is constituted as follows :—

V. A. Beckley, M.A., A.I.C., Agricultural Chemist.

M. H. Fox, B.Sc., A.I.C., Chemical Officer.

B. A. Pickering, Laboratory Assistant and Junior Clerk.

The Chemical Officer was on home leave from January 25th to September 3rd.

CORRESPONDENCE.

612 Inward and 395 Outward letters were dealt with. In addition 532 reports were issued.

TRAVELLING.

2256 Miles of extra departmental travelling, in connection with mealy bug destruction, soil and manurial investigations, were performed.

Four farmer's meetings at Kitale, Soy, Kyambu and Limuru were attended and addressed. The total attendance at these meetings was about 200.

AGRICULTURAL SHOWS.

Exhibits were staged at the Nairobi and Eldoret Shows.

ROUTINE WORK.

Sample.	Received.	Examined.	Refused.	Outstand- ing at 31-12-25.
Dips ...	506	475	28	3
Maize ...	10	10	...	...
Soils ...	53	40	10	3
Waters ...	11	7	2	2
Manures & Lime ...	33	23	8	2
Wireworm Remedy	20	20	...	...
Coffee ...	46	46	...	...
Toxicological ...	31	21	10	.
Miscellaneous ...	28	22	6	...
	738	664	64	10

DIPS.

Variation in Strength.	No.	1924 Percentage.	No.	1925 Percentage.
Within 1% ...	15	3.4	27	5.8
Between 1% & 5% ...	77	17.4	80	17.1
Between 5% & 10%...	78	17.6	73	15.6
Between 10% & 20%	109	24.6	112	24.0
More than 20% ...	164	37.0	175	37.5

It is evident that a few dips have been carefully maintained on strength. Of the samples received during 1924 there were 38.4% within 10% of the correct strength, 38.5% of those received during 1925 were in the same category. Of these dips, which are sufficiently accurate for most purposes, more were more nearly correct in 1925 than in 1924. One is tempted to consider that those who were careful about the strength of their dip wash in 1924 have been more careful this past year. A cursory examination of the records seems to bear this out.

A variation of between 10% and 20% is inexcusable. Such a figure shows that little attention has been paid to the maintenance of the proper strength. Dips that are regulated in this way will often have the concentration of the dip wash more than 20% incorrect. Such a concentration is dangerous, both to the farmer himself and to his neighbours. A dip wash more than 20% over strength is liable to cause deaths among the stock dipped, while one more than 20% under strength does not fulfil its functions. A reputed seven day dip, 25% under strength, is in fact only slightly more than three day strength. Cattle that have been through such a dip would not be efficiently protected against ticks after the third day. Complaints regarding losses caused by dipping or of the non-efficacy of dipping against East Coast Fever are in all probability from owners who do not properly control the strength of their dip.

Many owners are using "dip testers." These are very valuable to stock farmers but too much reliance cannot be placed upon the results obtained by their use. The testing fluid, an iodine solution, changes in concentration on keeping, also the tester is designed to determine the amount of arsenite present, arsenate is disregarded.

Dip owners who are in the habit of regulating the strength of their dip washes by means of these testers should always avail themselves of the free dip analyses performed quarterly. They would, by means of the laboratory results, be able to make any corrections necessitated by variation in the strength of the iodine solution and, thus, secure a closer control. Also they would learn the extent of oxidation of arsenite to arsenate and be able to allow accordingly.

SOILS.

Practically all the samples of soil examined have been samples taken in conjunction with investigations proceeding in the laboratories. No routine analyses of soils have been possible.

WATERS.

The samples of waters examined have been examined to determine their suitability for irrigation or for stock watering, and have, in the main been sent from the drier parts of the Colony.

MANURES & LIME.

Many of the samples examined have been samples of lime or suspected limestone. Included in the total are samples of the fertilisers used in the manurial experiments being conducted.

WIREWORM REMEDY.

These samples were taken as control samples by the Veterinary Research Division.

COFFEE.

The forty six samples were the samples from the manurial experiment just commenced. These passed through the ordinary process of curing.

TOXICOLOGICAL.

The majority of the samples examined under this head were of ingesta of stock dying from suspected arsenical poisoning and were mostly sent in by the Veterinary Division. Negative results were obtained in all but a few cases. Services were refused in a few cases where the work entailed in the search for unknown poisons would have been excessive.

MISCELLANEOUS.

Under this category fall a number of odd examinations, such as the analysis of tan bark, identification of chemicals, etc.

INVESTIGATIONAL WORK.

Mealy Bug Destruction.

The only type of spray that will destroy mealy bugs, which are sap sucking insects, are contact poison sprays. The problem in the evolution of such a spray does not lie in the discovery of a poison,—oils, alkalies, derris poison, nicotine, all kill the insects easily,—but in making contact between the spray and the insect, in other words, the problem lies in the discovery of a spreader. The problem in this case was to discover a substance or a combination of substances, which would cause the spray fluid to spread rapidly, in a thin film, over the coffee leaf and over the mealy bug. If such a substance could be found the destruction of the mealy bug would be a simple matter.

Twenty soaps and soap mixtures were tried, and twenty five other possible substances without any marked success. Many of the mixtures tried were remarkable spreaders on surfaces coated with another insect wax but none could even be called good on the coffee leaf surface or the mealy bug. The best was a castor oil soap, this caused a certain amount of spreading but only slowly.

The castor oil soap was combined with Kerosene oil in an emulsion, which emulsion gave promising results, but, owing to the volatility of oil, only the outside individuals of colonies of mealy bug were destroyed. A heavier petroleum distillate, solar oil, emulsified with castor oil soap, was tried. This gave better results than the Kerosene emulsion, a high percentage of deaths being caused. This emulsion used with an ordinary bucket pump sprayer, or better still with a small power sprayer, provides a means of controlling an infestation of mealy bug, but will not absolutely clear an infested plantation. To evolve a more efficient spray fluid would require a long and systematic research into the chemistry and physics of the surfaces of the coffee tree and the mealy bug, a research, which, under present conditions, the results would not justify.

The question of keeping ants off infected coffee trees was also a matter of investigation from the chemical side. A number of banding mixtures were prepared, some of these were efficacious for a very short period, but the surface was soon made passable by dust or by hardening of the mixture. Naphthalene mixtures were placed around the stems of the trees. These kept ants from crossing so long as the surface of the naphthalene remained powdery. Dew, mist and rain all formed a firm surface over which the ants could cross with impunity. However, the naphthalene mixtures were adapted.

Later, work upon coal tar distillates was started by Mr. Fox. The constituents more toxic to plant life were removed by distillation, leaving a mixture of aromatic substances boiling at a

high temperature, over 300°C. This mixture was tried by the Entomological Division, who report that ants could not cross a fabric band soaked in the fraction. The bands were found by observations extending over two months to retain this efficacy. The high boiling point of the fraction will ensure that the band will be efficacious over a long period while the more toxic portions of the original distillate having been removed, the bands will not have any serious deleterious effect upon the trees.

OXIDATION OF ARSENICAL DIP WASHES.

A preliminary investigation of this phenomenon was commenced on a laboratory scale. Organisms were isolated by the Mycologist from material supplied. Arsenite and arsenate media were inoculated with the organisms all of which showed that they both oxidised arsenites and reduced arsenates, a state of equilibrium being finally reached. These observations indicated that the microbes tried were not identical with those isolated by Green in South Africa.

Lack of facilities precluded a full investigation into the effect of the flora of dipping tanks upon the arsenical compounds, but the desirability of continuing the research has not been forgotten.

MANURIAL EXPERIMENTS.

The subject of manuring is one that is rapidly forcing itself upon the notice of farmers in Kenya. Soil analyses, while of value where a mass of data has been accumulated, are of very little value in a new country. Analyses only show what amounts of plant foods are present in the soil; they cannot show what the soil requires. Correlations between analytical results and crop returns are necessary before analyses convey any meaning. Manuring experiments serve the double purpose of showing quickly what is the effect of manures upon crop returns and at the same time, combined with analyses, give the basis for the interpretation of analytical results. Accordingly a number of manurial experiments have been commenced or arranged to be commenced in the near future.

SCOTT LABORATORIES.

For the long rains season of 1925 two experiments to determine the suitability of the various phosphate fertilisers available in the Colony for local soils were laid down. Unfortunately, owing to the drought, these experiments were a failure.

Permanent manurial plots have since been laid out in the grounds of the Scott Laboratories. These plots involve 144 plots of 1/80 acre each and will enable us to determine the effects of a number of fertilisers. The first crop will be planted during the long rains of 1926.

COFFEE MANURIAL EXPERIMENTS.

A fully supervised manurial experiment has been started on Kasarini Estate, Kyambu. This involves 46 plots of approximately one fifth acre apiece. Preliminary pickings before the manures have had time to act show that several seasons will pass before reliable conclusions can be drawn. Coffee is a crop that is very sensitive to climatic conditions and, in order to eliminate the effect of climate from that of manure, it will be necessary to continue the experiment for some time. Nevertheless, information of value in indicating the lines of manurial practice should be available in a season or two.

A co-operative experiment has been arranged with Mr. Knight at Cray Estate, Limuru. This experiment has been designed to correct a bad condition of coffee common in the area. Results should be available from this experiment in the course of a season or two.

MANURIAL EXPERIMENTS IN NAKURU DISTRICT.

Three experiments have been arranged in the Nakuru district, one on the plains soil, one near Rongai and one to the west of Nakuru. The manures for the first two experiments are supplied by the Department while in the last the owner of the farm, Mr. Moller, is supplying everything. These three experiments will commence with the coming season.

In addition several minor experiments have been arranged with farmers in various parts of the Colony. These experiments have been designed to elucidate certain special problems of the areas where the experiments are located.

A number of "farmers experiments" have been suggested to farmers who have been anxious to determine the value of manures.

GREEN MANURES.

The most expensive fertiliser constituent to purchase is nitrogen. The two commonest nitrogenous manures, nitrate of soda and sulphate of ammonia, after continuous use have a bad effect upon the soil; nitrate of soda leaves ordinary soda in the soil while sulphate of ammonia leaves sulphuric acid in the soil, both of which substances eventually have a detrimental effect upon plant growth.

Legumes, when infected by *Pseudomonas radicola*, the nodule organism, are enabled to fix atmospheric nitrogen, which, when the legume is ploughed under as a green manure, is added to the soil for subsequent crops. In many parts of the world this system of manuring has been shown to be much more economical than purchasing nitrogenous fertilisers.

In addition to supplying nitrogen, this system of green manuring adds humus to the soil. The value of humus lies very largely in its beneficial effect upon the physical condition of the soil, which facilitates the production of a good tilth. Any strong growing lush crop will serve as a green manure when humus is the only consideration, legumes are the only crops that will supply both nitrogen and humus.

Experiments to determine the most suitable legumes for green manuring have been commenced at the Scott Laboratories, in conjunction with the Agricultural Supervisor. Some forty legumes, indigenous and exotic, were sown during the short rains and are under observation.

One point worthy of note has been observed. This is that while all beans, peas, cowpeas, crotalarias, etc. are all severely infected by the requisite variety of nitrogen fixing bacterium the sweet clovers, and incidently lucerne, have no nodules. Hubam clover, a species of sweet clover, had grown fairly well in the grounds of the Scott Laboratory but the roots had not been examined. Apparently the hubam clover was drawing its nitrogen supplies from the soil as do non leguminous plants. Before sweet clover, which should be a valuable green manure in coffee plantations, will prove a success cultures of the requisite organism, to provide a means of inoculating the seeds will have to be produced.

GENERAL.

During the writer's tours symptoms of nitrogen deficiency were observed in many parts. At first sight this seems incredible but, when the climatic conditions of Kenya are taken into account, this loss of nitrogen from the soil is easily explicable. On the cultivation of virgin land the soil is well aerated, nitrification takes place rapidly, the nitrates produced are largely leached out of the soils during the rains and, in the lighter soils, lost to the crop. This state is often accompanied by a deterioration in the physical condition of the soils, owing to the destruction of humus. In the writer's opinion systems of crop rotation in which green manures enter are urgently needed. The present system of single cereal crop farming so common in the Colony will have to give way to a more rational system in which apparent losses will be balanced by gains in the main crops.

Certain farmers in the Nakuru district have expressed their intention to introduce rotation crops including a legume, for the time being beans, as a green manure crop. The results of these rotations should prove most interesting.

The soils of the Colony have, as far as has been possible, been studied in the field. Some very interesting problems are

indicated but until the laboratory is fully equipped, no systematic investigation into these problems can be instituted.

The thanks of this Division are due to Mr. H. Douglas, Kasarini Estate, Kyambu, for setting aside a portion of his plantation for the main coffee experiment and for performing the extra work entailed by such an experiment. Thanks are also due to Messrs. W. E. D. Knight, Limuru, J. J. Toogood, Nakuru, J. McKaye, Rongai, and H. P. Moller, Nakuru, for volunteering to conduct manurial experiments.

Finally I wish to record my appreciation of the loyal work of my staff and of the co-operation of my colleagues especially Mr. Watt, without whose assistance the plots at the Scott Laboratory would not be in their present condition.

V. A. BECKLEY,
Agricultural Chemist.

APPENDIX "F."

REPORT
OF
ENTOMOLOGIST.

STAFF.—

Mr. T. W. Kirkpatrick, M.A. (Cambridge), was appointed Assistant Entomologist and arrived on the 19th of July.

I left the Colony, on leave, on the 2nd of February, and returned on the 15th of November. Mr. H. Wilkinson, Plantation Inspector acted for me during my absence.

TRAVELLING.—

4,590 miles were travelled by car on Government Service.

H. Wilkinson	...	...	3,494 miles.
T. W. Kirkpatrick	...	...	.920 do.
T. J. Anderson	...	...	176 do.

CORRESPONDENCE.—

1,393 letters were dealt with ; the subjects are summarised as follows :—

Bees and Wax	...	...	8
Bloodsucking Flies and Ectoparasites	...	...	19
Citrus	...	...	18
Coffee	...	...	392
Cotton	...	...	15
Flax	...	...	2
Fruit Trees	...	...	6
General	...	...	223
Identification of Insects	...	...	161
Importation of Plants	...	...	234
Locusts	...	...	17
Maize	...	...	40
Sericulture	...	...	19
Staff	...	...	73
Tea	...	...	4
Termites	...	...	3
Upkeep of Laboratory	...	...	154
Vegetables	...	...	2
Wheat	...	...	3

1,393

PUBLICATIONS.—

1. Coffee Mealybug, Suggestions regarding Methods of Control. H. Wilkinson. (Local Press).

ROUTINE.—

a. 134 specimens of insects, damaged plants, seeds, etc., have been examined and reported on.

b. 204 applications for permits to import plants and/or seeds have been scrutinised, passed or amended.

c. Consignments of plants, parcels or packages, have been examined at Head Office and G. P. O.

d. Exhibits were prepared for the Agricultural Society's Shows at Nairobi and Eldoret.

e. The collections have been added to considerably.

SERICULTURE.

When on leave, June 11th, 1925, I attended a meeting of the Advisory Committee on Silk Production. This committee was appointed in 1916 to consider the question of increasing the production of raw silks within the Empire and to advise in connection with the work on silk which is carried out at the Imperial Institute.

The situation examined by the Committee is as follows: The world's demand for raw silk is in excess of supplies and is steadily increasing. The British silk manufacturing industry is dependent, almost entirely, upon foreign supplies of raw silk.

The silk produced within the Empire is relatively small in quantity and the greater part of the production is unsuitable for use in this country, owing chiefly to primitive methods of reeling. Silk obtains good prices in the world's market. The raising of silk of satisfactory quality would therefore benefit the producing countries and be welcomed by the silk trade.

The Committee's enquires have been along two main lines. Firstly, special attention has been given to the possibility of developing those silk industries which already exist in British countries and to the improvement of the technical qualities of the silk produced. Secondly, with the help of scientific officials overseas, experiments in silkworm culture have been organised with a view to ascertaining the sericultural possibilities of selected countries.

In their practical work the Committee have also organised reeling trials of cocoons in modern European filatures, followed by throwing and weaving trials in the works of their members. The results in nearly all cases have shown that with proper methods of reeling, silks regarded as useless for this country, assume a quality which would ensure for them a ready market: the sericultural experiments have shown in several cases that cocoons yielding silk of excellent quality can be produced in the countries concerned.

The Committee have come to the conclusion that the three most promising parts of the Empire for the encouragement of silk production are Cyprus, Iraq, and Kenya.

Arrangements have been made for trials to be undertaken here with the seed of all the best known varieties of mulberry which are used for sericulture in different parts of the world. This seed is expected shortly.

IMPERIAL ENTOMOLOGICAL CONFERENCE.

I represented Kenya, as an Official delegate, at the Second Imperial Entomological Conference which met in London in June, 1925.

Kenya contributes annually to the funds of the Imperial Bureau of Entomology the sum of £300 and, for the benefits derived from the very valuable work which the Bureau is doing for the Dominions and Colonies, in the way of identification of specimens, publications and advice in general, I consider that the £300 is a most excellent investment and hope that in future finances will allow of more money being so invested.

I was keenly interested in one aspect of the activities of the Bureau which was brought up for discussion and that is the part the Bureau can play in the collection and breeding of beneficial insects for distribution to those parts of the Empire where they would be of great value.

I suggested that, if as a result of the Conference some development of the Bureau's scheme to undertake the breeding of parasites was decided on, Governments such as Kenya might be prepared to make special payments for specific work in this connection thereby saving considerable expenditure not only to this Government but to other Governments concerned. This was embodied in the Resolutions of the Conference.

The Resolutions, which I signed, and which are of the greatest interest to this Colony I here quote :—

- (2) The Conference, recognising the value of the interchange of ideas between entomologists from all parts of the Empire, endorse the resolution passed by the Conference held in June, 1920, that similar Conferences should be held in London every five years, and trust that steps may be taken for the summoning of the third Imperial Entomological Conference in the summer of 1930.
- (3) The Conference recommend that from time to time, as circumstances may render practicable, meetings should be held in each of the Dominions and Colonies of the Entomologists, Mycologists, and other scientific officers for joint discussion, of their local problems, and that this principle should be extended to include meetings at some convenient central place of Dominion and Colonial Entomologists, Mycologists, and other scientific officers who are working in countries which are associated geographically or otherwise.
- (4) Having regard to the ever-growing importance of economic entomology, the Conference urge that the fullest consideration should be given throughout the Empire to the provision of funds to allow of such expansion of the work of the official entomologists as may be found desirable.

At the same time they strongly support the view that large planting companies, or groups of planters and farmers, should, in their own interest, follow the practice, already adopted in certain instances with satisfactory results, of engaging the permanent services of entomologists who can keep watch over the crops on the plantations or farms concerned with a view to their protection from insect pests.

- (10) The Conference accept the principle that the Bureau should arrange for the export to Overseas Governments of beneficial parasites, and they approve the estimate of £1,440 per annum for this work.

It is understood that if the annual contributions amount to £13,000 the annual expenditure in excess of the sum can be met for the next five years from surplus funds which the Bureau has accumulated; but should the Bureau be requested to undertake the supply of a parasite which involves investigations of a costly nature it should be open to the Director

to represent to the Government concerned that the work cannot be undertaken without an additional grant for the purpose.

- (15) The Conference recommend that at the end of each financial year all the contributing Governments should receive a statement showing the work accomplished by the Bureau during the year.
- (16) While recognising that in existing circumstances and with the funds at present at the disposal of the Bureau such a proposal may not be practicable, the Conference record the opinion that it would be of the greatest assistance if arrangements could be made for a Senior Officer of the Bureau to visit at request the Government Entomologists overseas.
- (17) The Conference are glad to learn that proposals have been made for the despatch of an International Scientific Mission to Uganda under the direction of Dr. H. Lyndhurst Duke, for further research in connection with tsetse-flies and human trypanosomiasis, but they strongly urge that arrangements should be made for comprehensive measures against tsetse (both in the direction of immediate practical work and further scientific research) in the British dependencies in Tropical Africa on the lines contemplated in the Report of the East African Commission.

Insects of Economic Importance During the Year.

GENERAL.

The outstanding feature of the year under review was the work done in connection with the control of the coffee mealybug.

There can be little doubt that the weather conditions which prevailed during most of the year were responsible for an increase in the loss caused by insects because when conditions are unfavourable, plant growth is retarded and crops are then most susceptible.

ON COFFEE

MEALYBUG

1. As I was on leave most of the year, and therefore not in touch with the experimental work which was done, the following notes on mealybug control have been written by Mr T. W. Kirkpatrick.

The work done, previous to the arrival of Mr Kirkpatrick in the Colony, was compiled by Mr. Wilkinson and published in the Local Press.

"This work, and the treatment recommended, may be shortly summarised as follows :—The Agricultural Chemist, Mr. V. A. Beckley, after numerous experiments, had discovered a spray, made of castor soap and solar oil, which is probably about as efficient as any spray can possibly be against this pest.

When the number of trees attacked was small, painting with Laurel Paraffin or Methylated Spirit was recommended.

Some ten species of insects—8 ladybird, a lacewing fly and a Psocid were known to be predaceous on the mealybug : but their beneficial activities were hampered by the presence in large numbers of an ant, against which was recommended a repellent made of 4 parts of crushed limestone to one part of naphthalene, to be placed round the base of the tree ; or else one of the somewhat more expensive but equally efficient proprietary repellents, such as Wormite.

My first endeavour was to investigate more closely the natural enemies of the mealybug and the attitude of the ants towards them. This investigation is by no means completed but there are now known over 30 species of insect which are predaceous on the mealybug ; comprised as follows :—

13 species of Ladybird Beetles	...	Coleoptera
4 " " Two-winged Flies	...	3 Syrphidae & 1 Agromyzidæ
2 " " Moths	...	Lepidoptera
2 " " Green Lacewings	...	Chrysopidæ
3 (perhaps more) species of Brown Lacewings	...	Hemerobiidæ
1 species	...	Coniopterygidæ
6 (at least) species of	...	Psocidæ

As against this, however, two of the most useful Ladybirds, two of the Flies, and one, at any rate, of the Brown Lacewings, are themselves parasitised by various small Hymenoptera ; a predaceous Bug is known which preys on at least one of the Ladybirds and another Bug which destroys the Psocids.

Far more serious, however, is the fact that the ant, *Pheidole punctulata*, is known to be inimical to nearly (and probably quite) all of those beneficial insects in one or more of their stages. Thus some are destroyed in the egg stage, some when larvae,

others when adults; and even if not actually killed by the ants their feeding and oviposition are undoubtedly hindered.

It has also been ascertained that the mere presence of the ants, apart from any interference with the natural enemies, causes the mealybug to breed faster and be more vigorous, probably mainly owing to the fact that the ants provide the mealybug with an efficient sanitary service, cleaning up their excreta and removing dead bodies.

It thus became clear that, with such an abundance of natural enemies, spraying was the wrong method of tackling this problem, as any spray must undoubtedly kill the greater proportion of these beneficial insects.

Experiments were, therefore, made with a view to poisoning the ants. Although a medium was found of which the ants were exceedingly fond and which they would carry off bodily to the nest: also a poison sufficiently slow not to kill workers until they had time to feed it to the larvae, it was a complete failure as, no sooner had the first few casualties occurred, than the ants learnt by experience and rejected the poison from the nest and would not touch it again.

Attention, was, therefore, turned to the discovery of a repellent which would be cheaper and more effective than the lime and naphthalene previously recommended.

Some little measure of success has already attended this line of investigation for, after numerous experiments with various repellents, both chemical and mechanical, one has been found which, though not perhaps ideal, is a great advance on naphthalene, both from the point of view of cost and efficiency. I am greatly indebted to the Chemical Officer, Mr. M. H. Fox, for valuable help in preparing this as well as many of the other substances found to be less effective. It is hoped that this material will be available in quantity by March or April, 1926.

That the Ladybirds and other natural enemies do actually increase, when protected from the ants, has already been amply proved from experiments with the above mentioned repellent.

Experiments are also in progress to ascertain whether resistance or partial immunity to mealybug attack can be obtained through the application of various manures to the coffee plant.

It is also hoped that it will be found possible to discover an artificial food on which some of the more useful indigenous ladybirds can be easily reared. If this should prove successful, it will be possible to keep a supply of these insects ready to liberate on any outbreak of mealybug. Preliminary experiments in this direction are distinctly encouraging.

During my leave some time was spent in Italy and Sicily with a view to collecting and introducing, to this Colony, the Sicilian mealybug parasite *Tanaomastix abnormis*.

Twenty boxes of material were collected from the neighbourhood of Palermo, Catania, Barcelona and Messina, shipped to Naples and finally to Nairobi.

Up to date no parasites have hatched from this material and it would seem that the introduction has not been successful.

I wish, here, to place on record my appreciation of the help received from the Royal Italian Ministry of Agriculture, the Director of the College of Agriculture at Portici, Dr. Corrado Corizza and the British Consuls or Vice Consuls at the places visited.

2. *Antestia lineaticollis* Stal.

Several outbreaks have been reported. The Senior Coffee Officer has been experimenting with a poison bait, consisting of arsenite of soda and sugar, with good results.

3. *Thliptoceras octoguttale* Fld.

The Coffee Berry Moth, was reported from Turbo Valley, Kitale, Muhoroni, Songhor, Kericho, Thika, Chania Bridge and Kyambu.

4. *Parasa vivida* Wlk.

Specimens of this leaf eating caterpillar were forwarded from Nairobi and Kaimosi.

5. *Scale Insects.*

(a) *Pseudococcus perniciosus* N and W., Thika, Ndarugu, Chania Bridge, Nairobi, Kyambu and Kericho.

(b) *Pseudococcus longispinus* Targ.—Turbo Valley and Hoey's Bridge. (c) *Asterolecanium coffeae* Newst.—Kyambu.

(d) *Pulvinaria psidii* Mskl.—Cherangani and Turbo Valley.

(e) *Ceroplastes ceriferus* And.—Kaimosi, Muhoroni, Thika and Nairobi. (f) *Cerococcus hibisci* Green, has been reported from

coffee for the first time—Ruiru District and Ithanga Hills. This is the first record of this scale from Africa. It is probable that it has been introduced on ornamental plants.

6. The following Pentatomid bugs have been recorded from coffee :—

Plataspis flavosparsa Montr., *Plataspis galericoides* Wlk., *Steganocerus multipunctatus* var *argus* F., *Cryptocrus comes* F., var *pinguis* Germ. *Callidea bohemani* Stal., *Caura rufiventris* Germ.

T. J. ANDERSON,

Entomologist.

APPENDIX "G."

REPORT
OF
MYCOLOGIST.

STAFF CHANGES.—

Mr. F. W. Evans, Junior Clerk, resumed duty on February, 20th, on return from home leave.

TRAVELLING.—

I was absent from Nairobi on duty for 62 days during the year. 4,500 miles were covered on Government service and 89 visits were made to farms in European occupation and about 30 to those of Indians.

The above travelling is chiefly accounted for as follows :—

- January ... A tour was made in Kericho and Sotik with the primary object of ascertaining, at an early stage in the development of the tea industry, what diseases exist in the plantations. Several coffee farms were also visited.
- June ... Investigations were made at Muhoroni regarding the occurrence of a parasitic weed (*Striga hermonthica*) in maize and mtama crops after which several days were spent at Turbo Valley in carrying out experimental work connected with coffee berry disease.
- August ... A visit was paid to Kibos, Muhoroni, Miwani and Koru in connection with an outbreak of sugar cane mosaic disease.
- September ... The occurrence of head smut of maize was investigated on certain farms in Solai Valley after which an extensive survey of the position with regard to sugar cane mosaic disease was made in Kisumu, Kibos, Miwani, Kibigori and Muhoroni districts.
- December ... A tour of the Turbo Valley, Soy and Hoey's Bridge districts was carried out chiefly to ascertain the results of treatment against berry disease. After attendance at the Eldoret Agricultural Show, a brief visit was made to Kaimosi district in connection with the treatment of pink disease and leaf disease of coffee,

CORRESPONDENCE.—

Inward letters numbered 584; outward letters, 481. In addition 89 circulars regarding sugar cane mosaic were sent to individual farmers.

Enquiries from settlers concerning plant diseases were numerous and covered a range of 33 different hosts. Coffee enquiries were the most frequent but sugar and maize were responsible for considerable correspondence. Letters from India, Tanganyika Territory, Nyasaland and Somaliland, asking for mycological information, were also dealt with.

Constant touch was kept with the Director of the Imperial Bureau of Mycology who rendered valuable assistance, and letters were exchanged with a number of scientific institutions in various parts of the world on mycological subjects of importance to Kenya.

Matters connected with the Diseases of Plants Prevention Ordinance accounted for a considerable correspondence.

INVESTIGATIONAL WORK.—

Coffee berry disease investigations were continued during the year and further inoculation work was carried out. In last year's report it was stated that the berry disease had been successfully produced by inoculating green berries with a strain of the fungus *Colletotrichum coffeanum*, differing from that commonly met with in the colony as the cause of brown blight and other minor coffee maladies. It was considered desirable to test the possibility that one or other of these latter forms might also be capable of producing the disease in green berries. *Colletotrichum* was therefore isolated from leaves and ripening berries affected with brown blight and these forms were inoculated into green berries at Elgon Estates (Mr. H. C. Potter), Turbo Valley. In all cases results were negative. Positive results, however, were obtained when cultures isolated from Kericho coffee affected with berry disease were used, the identity of the disease in the two districts thus being confirmed.

Very few settlers have put into practice the complete recommendations of the Department for the control of the berry disease. Undoubtedly labour shortage has been a great handicap but from the few field observations which it has been possible to make, there can be no doubt that marked benefit is derived where the full programme of plantation sanitation combined with consistent spraying during the wet months is carried out. One settler who sprayed consistently during the past season estimates his loss from coffee berry disease at $8\frac{1}{2}\%$

against 50% in the previous year. Even where spraying is considered impossible, a quite appreciable improvement can be obtained by thorough sanitary measures, including especially the destruction of diseased berries, and by de-cropping to relieve the bushes from the strain of overbearing. There is a tendency on the part of some settlers in the affected districts to attribute to berry disease the loss of all berries which fall from the bushes.

Experiments were begun during the year at Mr. L. A. Johnson's farm, Turbo Valley, to test the usefulness of certain manures in increasing the resistance of coffee bushes to the berry disease. On account of their reputation for conferring such resistance in the case of certain diseases of other crops, the chief manures put under trial were potash and phosphate. Results from these experiments are not to be expected yet. A further line of attack against the disease is also being tested at the same farm, Mr. Johnson having begun raising plants from seed from particular bushes which have shown consistent resistance to berry disease. The first of these have already reached the planting out stage and show a marked resemblance to their parent plants, a feature which encourages hope that they may prove to have inherited the quality of disease resistance also. In collaboration with the Plant Breeder, further selections along the same line are being carried out.

The assistance rendered by Mr. H. C. Potter, of Elgon Estates, and by Mr. L. A. Johnson has again cordially to be acknowledged.

An outbreak of sugar cane mosaic disease was reported from Nyanza Province and extensive investigations were made concerning its distribution and the degree of susceptibility of the different cane varieties grown. It was abundantly evident that the disease had existed in part of the affected districts for more than a year. Special attention was given to the suggestion that the disease had originated from seed pieces distributed from the ex-Government farm at Kibos but no evidence could be found to support that view while much could be produced to the contrary, notably the complete freedom from mosaic of neighbouring susceptible cane. As far as is known the mosaic disease does not exist outside the Nyanza Province and quarantine measures have been instituted to protect other growers. Further steps with a view to the eradication of the trouble are under consideration. As is the case in other countries, the Uba variety appears everywhere immune to the disease while Kampala (Striped Ribbon) is susceptible but exhibits a high degree of tolerance. Infected Kampala cane, however, while suffering little itself, precludes the cultivation of other desirable varieties, such as Sealey Seedling, which are badly affected by mosaic disease,

As previously reported, the pink mouldy condition of maize investigated in 1924 was found to be caused by a species of *Fusarium*, believed to be a stage in the life history of the fungus *Gibberella saubinetii* which is well-known elsewhere as the cause of serious diseases of certain cereals and other crops. During 1925 the missing *Gibberella* stage was found on dead maize stalks in two districts, namely, Kericho and Kipkarren. The previous diagnosis was thus confirmed. Among the important maize diseases produced by the fungus in America is seedling disease. Since this has not so far been reported in Kenya, attempts were made at the laboratory to produce it artificially by raising seedlings in heavily infected soil. All such attempts have so far failed. This supports the evidence of American investigators who found that maize was most susceptible to seedling blight at temperatures of 12 to 14 degrees centigrade and became progressively less susceptible at temperatures from 16 degrees to 24 degrees centigrade (approximately 61 to 75 degrees Fahrenheit), infections being nil at the higher temperature. Soil temperatures at the altitude of Nairobi are therefore most unfavourable to the development of seedling blight and, although no other soil data are available, it seems possible that no Kenya maize district is specially favourable to this form of disease.

During the greater part of the year work was in progress in co-operation with the Department of Scientific and Industrial Research, at whose request samples of various fabrics which had been sent from England were exposed in different ways to climatic influences in this country. The object of this work was to obtain data as to the effect of such climatic factors and of micro-organisms on the deterioration of the fabrics. A considerable volume of meteorological data was required in connection with the exposures of the fabrics.

What appears to be the same fungus as that isolated from diseased coffee seedlings in 1924 has since been found in connection with a similar disease of antirrhinums and as the cause of potato scab at Nairobi. The strains from these hosts and also from strawberry roots have been grown in culture and some attempts at cross inoculations from one host to another have been made. So far the disease has not been successfully reproduced in coffee seedlings but the strain from coffee was made to produce the antirrhinum disease. In view of the apparent common occurrence of the fungus in the soil of Nairobi district and of the fact that the seedling disease has only once been found in a coffee nursery, it seems likely that the fungus requires very specially favourable conditions to become aggressively parasitic and it would seem that such conditions have not so far been obtained in the laboratory experiments with coffee.

Experiments were carried out during the year in collaboration with the Agricultural Chemist, with two organisms, not yet identified, which were found growing in an arsenic solution in the chemical laboratory. As a result of this work it was proved that, under certain conditions, both organisms were capable of converting arsenate into arsenite, a property which may present useful possibilities in connection with cattle dipping.

Inoculation experiments with *Cerebella* disease of native mtama (sorghum) were resumed. As a result very successful results in producing the disease were obtained, but only when the heads were exuding a sugary secretion. This phenomenon seems to occur only during cold weather but whether it is entirely due to climate remains uncertain. Natural infections were also found on mtama in the Kikuyu Reserve for the first time in 1925 and a similar fungus (possibly identical) was found on the indigenous grass, *Cynodon dactylon*.

Attention was paid to a case of sudden blackening of sisal leaves after cutting. From enquiries and observations made, there seems little doubt that the trouble was due primarily to climatic causes, the worst effects being noticed on very hot days. It has since been found that similar conclusions were reached in investigations made of what seems to have been the same trouble in Tanganyika Territory.

What appears to be a new disease of peas was the subject of experiment towards the close of the year but the work has not yet proceeded very far.

ROUTINE WORK.

Exhibits showing the principal diseases of crops in Kenya, were prepared and staged at the Agricultural shows at Nairobi and Eldoret respectively.

The Annual General Meeting of the Coffee Planters' Union was attended and questions relating to coffee diseases were dealt with.

Over 200 plants collected in various parts of the country and named by the Royal Botanic Gardens, Kew, were classified and added to the botanical herbarium at the Scott Agricultural Laboratories. These included a large number of duplicates of collections of pasture plants made by other officers of the Department (Messrs R. Lathbury, B. Frowde, and N. D. Spranger) at the request of the Director of the Kew Gardens, in connection with work in progress on the natural pastures of East Africa.

The following mycological publications were printed during the year:—

A. Articles in the local press on

- (1) Coffee Berry Disease.
- (2) Ear rot disease of maize.
- (3) Sugar cane mosaic disease.

B. Bulletins on

- (4) Fungoid diseases of coffee in Kenya Colony.
- (5) Diseases of maize and notes on a parasitic maize weed in Kenya.

GENERAL OBSERVATIONS AND REMARKS.

The following diseases were noted or definitely identified for the first time in 1925 :—

COFFEE.	Seedling Blight.	<i>Rhizoctonia solani</i> Kuehn. (Mentioned in 1924 Report. Now confirmed).
„	Mealy Bug Root Disease.	Fungus not determined
MAIZE.	Head Smut.	<i>Sorosporium reilianum</i> (Kuehn) McAlp.
„	Ear Rot.	<i>Gibberella saubinetii</i> (Mont.) Sacc.
„	Streak disease.	
SUGAR CANE.	Mosaic Disease.	
TEA.	Brown Blight.	<i>Colletotrichum Camellieae</i> Mass,
„	Scab.	Physiological.
MTAMA (Sorghum).	Head Smut.	<i>Sorosporium reilianum</i> (Kuehn) McAlp.
„	Rust.	<i>Puccinia purpurea</i> Cke.
„	Smut.	<i>Sphacelotheca sorghi</i> (LK). Clinton,

**BULRUSH
MILLET**

(*Pennisetum typhoideum*). Green Ear Disease. ? *Sclerospora graminicola* Sacc.

**GROUND-
NUT.**

Leaf Spot. *Cercospora personata* (B.&C.) Ellis.

LUCERNE. Anthracnose. *Colletotricum Trifolii* Bain.

BEET. Leaf Blight. *Cercospora denticola* Sacc.

BEANS. On leaves. *Isariopsis griseola* Sacc.

**PODOCAR-
PUS**

GRACILIOR. On leaves. *Corynelia clavata* (L.) Sacc.

CYNODON

dactylon. Smut. *Ustilago cynodontis* P. Henn.

„ On inflorescence. *Cerebella cynodontis* Syd.

SOLANUM

SP. On leaves. *Aecidium solani-unguiculati* P.Henn.

WEDELIA

SP. *Tuberculina persicina* (Ditm) Sacc.

Parasitic on pustules of maize and mtama rusts. *Darluca filum* (Biv.) Cast.

Pink disease and berry disease of coffee, reported in previous years in other districts, were found at Kericho in 1925, the former on two farms, the latter on one only.

Of the newly reported diseases the most noteworthy is the mosaic of sugar cane. It occurs in almost every sugar growing country and is capable of causing great damage in susceptible varieties. Like streak disease, just identified on maize, it belongs to the class of virus diseases whose causative agents are unknown. The latter disease has only recently been described from Natal where it does considerable harm to the maize crops in certain localities. The amount of infection seen in the few cases observed so far in Kenya has not been great.

Head smut of maize, newly reported, is capable of causing serious losses and is less easy to control than many other cereal

smuts. This disease and the mosaic of sugar cane had both been present in the country some time before they were reported and consequently had spread somewhat before proper action could be taken. With the present limited staff, it is impossible to make the inspections necessary to keep a proper watch for new diseases and it is therefore essential that settlers report all diseases new to them immediately they are found.

Considerable damage to coffee as the result of leaf disease (*Hemileia vastatrix*) was observed at Koru where many acres were defoliated. Much of this damage could be prevented by systematic spraying but labour shortage is again a considerable obstacle.

An epidemic of black stem rust of wheat (*Puccinia graminis*) caused severe loss on a few farms in the Trans Nzoia during the past season.

J. McDONALD,

Mycologist.

“APPENDIX H.”

PLANT BREEDING.

At the beginning of 1925 trial grounds at Njoro, Gilgil and Machakos, were carrying varieties of Wheat sown in the previous year.

The centres at which breeding took place were the Scott Agricultural Laboratories, and at Njoro, where cages are erected.

At the Scott Laboratories 115,000 grains belonging to hybrid families were sown singly inside the cage and on land outside. Arrangements were made for rapid watering should the season become droughty.

Forty-six pure line varieties were sown in rod rows in triplicate in April and were harvested and bagged in the middle of August. Half of this number was rejected on yield returns and 24 varieties were again planted in triplicate rod rows in November.

With the “long rains” an area of about 5 acres was sown with “Kenya Governor” at Kabete, and during the short rains a further area of 30 acres was sown with the same wheat.

“Kenya Governor” is a new wheat bred in this country. It is almost beardless, and red-chaffed. It is blue-grey in colour and has purple auricles, when in the green stage. It has a large white grain and is highly resistant though not immune to the Black stem rust, and is susceptible to the Yellow rust. It matures in about 4 months at 6,000 feet altitude, and yields at a rate of about 7 bags to the acre.

At Natai Emuin Farm, Njoro, in the breeding cage and land nearly 140,000 grains of the F_3 and F_4 generations of hybrids were sown. The crosses were made in order to secure wheats which would combine resistance to *P. graminis* and *P. glumarum*. In addition 53 pure line varieties were sown in triple rod rows in triplicate, and of these 23 have been retained for further yield test in 1926, thereafter the best will be multiplied for issue in various suitable areas.

Co-operative work.

Pure line varieties were planted on the following farms in different areas. The varieties chosen were those which had exhibited considerable immunity to *P. graminis* chiefly, and a few which were known to be susceptible were planted alongside to give a measure of the attack.

- (a) At Machakos—Mr. Harold Hill's Farm—5,000 feet—Warm and moderately dry.
- (b) Solai Escarpment—Mr. Patten, Gilgil—8,000 feet—Cold and rainy.
- (c) Makuyu—Mr. McEntee—5,000 feet—Warm and moderately dry.
- (d) West Kenya—Capt. Kenealy, M.L.C.—6,500 feet—Cold and dry.
- (e) Trans Nzoia—Major Knapman—6,200 feet—Warm and rainy.

(a) *At Machakos :*

Forty-six pure line varieties were sown in triple rod rows in triplicate and harvested and threshed in August. There was no *P. glumarum*. *P. triticina* (leaf rust) and *P. graminis* occurred to the usual extent. Only four of the pure lines had less than a 10% infestation of *P. graminis*.

On this farm multiplication of the Droop wheats and of Kenya Governor was undertaken.

- (b) *At Solai Escarpment, Gilgil :* Fifty three pure line Njoro varieties were sown in triple rod rows in triplicate in July. Of these only eleven were resistant and twelve fairly resistant to *P. glumarum*, Kenya Governor was tested but was most susceptible to *P. glumarum*. Some *P. triticina* was in evidence,

In addition 5 lbs. of seed of most of the above varieties was broadcasted in plots in order that multiplication of the best kinds would not be delayed.

- (c) *Makuyu.* Twenty three pure line varieties were planted in the usual rod row fashion surrounded by a sowing of Kenya Governor. Owing to the depredations of Buck and Cattle, and also due to a poor season, little information was gained, but Kenya Governor gave excellent promise of suiting the conditions.
- (d) *West Kenya :* Forty-six pure-lines of Kabete varieties were sown in the usual rod rows at the end of March. A very severe drought rendered the work abortive.

- (e) *Trans Nzoia* : In February a number of pure lines were sown for testing and multiplication purposes and a further twenty-six varieties were sown on an area of 19 acres for multiplication purposes. The early sowings of wheat gave great promise and some fine yields were secured, particularly from Kenya Governor. The later sowings in July, however, all succumbed to *P. graminis*. A very bad rust season was encountered. Selections from unaffected plants in Cross Eleven were made which it is hoped to multiply. The type of plant resistant to rust in the old issue of Cross Eleven was easy to determine and a number of plants were pulled up and allowed to ripen off in trenches, which were watered. As the crops were going to be destroyed this was the only way of saving the grain. The plants were sorted out according to their stooling capabilities and, when so threshed, a germination test showed 89% viable and multiplication will take place in 1926.

Maize Selection : The Plant Breeder and the Flax Officer again selected and marked plants in the field, the undersigned making the final selections of the ears after harvest. The utility of such selection is easily demonstrated, one farmer reporting an increase of five bags per acre from selected as against ordinary seed on his own farm. It is obvious that there offers a large opening for selection in our maize fields and it is hoped that field selection will become more general.

Coffee : A selection of bushes apparently immune to Coffee Berry Disease was made in conjunction with Mr. L. A. Johnston of Turbo. The bushes have been covered with cheese cloth and the seed secured will be planted to determine whether immunity may be transmitted to some of the seed when the bushes self fertilise.

Personal : The Plant Breeder was unfortunately invalidated home on sick leave about the middle of the year and the section has carried on with the services of a Junior Clerk and by the undersigned at times assisted by the Flax Officer. The need for a less vulnerable section is evident; an increase in staff and an extension of Plant Breeding and selection work is necessary.

Travelling : On account of the widely scattered points at which work is undertaken the Officers performing this work do a considerable amount of travelling each year.

Seed Wheat Register : A Register of seed wheat for sale has been opened, farmers sending in samples of their wheats with quantity available and price. Very few have availed themselves of the service which perhaps was prematurely established.

A stone building was erected as a Laboratory at the Scott Agricultural Laboratories.

Two addresses on Wheat and demonstrations with varieties were given by the Plant Breeder, one to the Gilgil Farmers' Association, about forty persons attending, the other at Machakos before a meagre attendance. Arrangements in progress for further extension work were terminated when Mr. Burton went on leave.

I would advocate the establishment of a farm in the Nakuru area on which plant selection in Maize and the breeding of Wheat could be carried out. Trials on manuring and green manuring with a series of rotations under trial would yield valuable information in a few years.

The Department should be represented by local Officers in the Nakuru and also in the Plateau-Trans Nzoia area, for the very good reason that Agriculture in Kenya is in a state of transition to more intensive systems and any work which will help the change is of great value to the country.

I wish to record my satisfaction with the work Mr. Noble has been able to do, and to thank those farmers who have been so good as to undertake trials notably, Messrs. Sewall and Wright of Njoro.

E. HARRISON,

Deputy Director of Agriculture,

In absence of G. L. J. Burton (Plant-Breeder).



Coffee in Bearing near Nairobi.

APPENDIX "I"

REPORT

OF

SENIOR COFFEE OFFICER.

STAFF.

On the 26th March Mr. Bester was temporarily engaged as Acting Inspector of Plantations, and his engagement terminated on the 30th June. During this period he was engaged on Coffee inspection work.

TRAVELLING.

I travelled by motor car 5,808 miles on Government duty and was absent from my station for 165 days on duty.

LECTURES AND FIELD DEMONSTRATIONS.

These were given in Kyambu, Limuru, Kericho, Sotik, Kitale and Soy. Also a considerable number of pruning demonstrations were given on individual plantations.

INTERVIEWS.

I held in my office 237 interviews with Coffee Planters and visitors to the Colony.

CORRESPONDENCE.

Inward letters numbered 396.

Outward letters numbered 317.

PUBLICATIONS.

1. Leaflet "The use of Sesbania Shade"

2. Bulletin No. 1 of 1925 "The Coffee Industry of Kenya Colony."

STATISTICAL RECORDS.

From Statistical information obtained as at the 30th June, 1925, the total area of coffee planted was 65,140 acres. This figure shows an increase of 5,086 acres over last year's return. The total production of clean Coffee was 104,419 cwts, and of buni 11,111 cwts, giving a total of 115,530 cwts.

The acreage and production are based on returns received from 696 planters.

The unfavourable weather conditions account for the decrease of output as against last year.

The acreage planted this year would have been considerably more had the rains been normal.

INSPECTIONS.

During the year 272 inspections were made. The Acting Inspector of Plantations made 100 visits to Coffee estates, chiefly in connection with Mealy Bug.

Notices under the Diseases of Plants Prevention Ordinance were served on seventeen occupiers.

The following is a summary of districts visited, showing the the number of visits made and the number of plantations affected with fungoid diseases and insect pests:—

DISTRICTS.	FUNGOID DISEASES.								INSECT PESTS.												Total number of visits.			
	Leaf Disease.	Brown Blight.	Black Blight.	Brown Eyespot.	Coffee Berry Disease.	Pink Disease.	Root Rot.	Stem Dieback.	Berry Moth.	A Coffee Borer.	Mealy Bug.	Mealy Bug Loggishms.	Green and Brown Scale.	Asterolecanium.	Waxy Scale.	Ischnaspis longirostris.	Pulvinaria psidii.	Unnamed scale.	Thrips.	Antestia.		Cutworms.	Borers.	Damaged beans probably caused by some sucking insect.
Kyambu	17	5	9	..	..	..	..	1	7	..	8	..	3	1	..	..	..	1	8	4	1	..	.....	
Ruiru	11	3	7	..	..	..	..	..	6	..	12	..	3	..	..	..	..	1	9	2	1	..	.....	
Limuru	2	..	4	..	..	..	1	4	5	..	..	..	..	..	..	..	..	1	..	6	1	..	.....	
Ngong	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	
Thika, Donyo Subuk, Ithanga & Makuyu	18	7	19	..	..	..	..	..	17	..	14	..	12	2	2	1	..	1	15	2	5	2	.....	
Nyeri	9	8	18	..	..	..	..	9	1	..	..	..	18	..	2	..	..	..	6	11	9	1	.....	
Fort Ternan	6	5	1	1	..	..	..	..	..	6	..	..	1	1	1	..	..	..	1	2	3	..	.....	
Koru	12	9	1	3	..	1	2	..	..	..	..	..	1	..	1	..	..	..	3	6	2	..	.....	
Lumbwa	8	2	3	..	..	..	..	..	..	2	1	..	3	2	..	..	..	..	..	2	3	..	.....	
Kericho	9	2	1	4	..	2	..	..	..	..	..	..	4	..	..	..	..	..	..	2	1	..	.....	
Buret	6	1	1	..	..	..	4	..	..	..	1	..	7	1	..	..	..	..	..	..	2	..	.....	
Sotik	9	1	7	..	..	..	..	..	..	..	1	..	4	..	..	..	..	..	..	..	2	..	.....	
Trans Nzoia	8	5	27	3	6	..	..	..	3	..	1	2	27	..	1	1	1	1	5	2	5	9	.....	
Uasin Gishu	22	6	10	1	7	..	..	..	7	..	1	1	10	2	1	..	1	2	7	2	5	9	.....	
Kaimosi	16	13	7	4	..	9	6	..	10	..	..	..	4	2	..	..	..	2	..	..	..	..	.....	
Eldama Ravine	1	..	1	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	.....	
Nakuru (Rongai)	9	1	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	.....	
Nakuru (Solai)	2	..	..	..	..	..	..	..	1	..	..	..	1	..	1	..	..	..	3	2	1	..	.....	
Machakos	5	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	
Parklands	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	
Coast	7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	
Total	272	121	67	8	14	9	7	11	60	14	39	3	99	6	8	2	1	6	57	27	44	3	2	1

LEAF DISEASE.

This disease was very prevalent both in Fort Ternan and Koru. Severe outbreaks not only affect the quality of the crop but cause considerable dieback. Spraying is advocated, but with the exception of a few cases has not been carried out.

BROWN BLIGHT.

Nothing serious to report.

BLACK BLIGHT.

Found on coffee trees affected with scale insects.

BROWN EYE-SPOT.

Chiefly found on nursery plants, but no material damage noticed.

COFFEE BERRY DISEASE.

This disease is on the increase. New plantations coming into bearing for the first time have become infected. Although there is a difference of opinion amongst the planters as to whether spraying is beneficial, I consider, that from observations made, spraying has been most beneficial, especially if the coffee shambas have been kept in a proper state of cultivation.

PINK DISEASE.

This disease is now recorded on three more plantations in Kaimosi. It is being kept well under control by cutting and burning the affected twigs.

ROOT ROT.

No serious outbreak occurred.

STEM DIEBACK.

The cases found were not the ordinary dieback from overbearing, but were possibly due to the Stem disease "*Colletotrichum*." Instructions given were that all affected twigs should be cut off and burnt.

BERRY MOTH.

Reported on a large number of plantations, it is particularly bad this season in comparison with other years,

COFFEE BEAN BORER.

An unknown coffee bean borer has been reported from three localities and this will be investigated.

"MEALY BUG."

This pest has spread in the Kyambu, Ruiru and Thika Districts to an alarming extent. The loss of crop from the pest is difficult to estimate on account of the abnormal season. Nevertheless I consider this to be the worst pest on coffee and the set back has been keenly felt by the planters concerned.

During the year a considerable amount of experimental work was carried out in conjunction with the Entomologist and Agricultural Chemist.

Mealy Bug has been held in temporary control by the aid of Psocids, indigenous ladybirds, spraying and applying Wormite at the base of the trees. This latter is only effective by keeping the ants away from the trees as long as it remains dry.

It would appear, from the experiments already conducted, that provided the ants are kept from the trees, the mealy bug will be controlled by the natural parasites already present. There is sufficient evidence to prove that the particular creosote preparation is preventing the ants from gaining access to the bushes and in the experimental plot where the ants are kept off the mealy bug is well controlled by the indigenous *Chilocorus* ladybirds.

MEALY BUG (LONGISPINIS).

Reported only in the Uasin Gishu and Trans Nzoia. Outbreaks were in a mild form.

GREEN SCALE.

An epidemic of Green Scale occurred in the Cherangani area. Capex Lime sulphur is being used. In many districts where green scale was reported I noticed large numbers of larva of ladybirds.

BORER.

A serious outbreak of borer "*Dirphyra* sp." occurred on a plantation at Thika, about 30 acres of coffee was affected. The trees were stumped and burnt.

ASTEROLECANIUM.

About 30 acres of coffee in the Ithanga area were badly affected with this scale and to such an extent that it seemed

too big a task to wash thoroughly the affected trees with an insecticide that it was decided the area should be stumped and burnt after the crop had been harvested. About 4 to 6 weeks after my visit the Acting Inspector of Plantations visited this shamba and reported that the scale had entirely disappeared although no stumping or spraying had been carried out. The explanation of this is obscure.

Waxy Scale, *Ischnaspis longirostris*, *Pulvinaria Psidii*, and *Cerococcus hibisci*, appear to be minor pests causing practically no damage.

THRIPS.

This pest threatened to do much damage this year owing to the dry season, but the satisfactory short rains checked their increase. Nevertheless slight damage has occurred in certain areas.

ANTESTIA.

Much success was achieved by spraying a poison bait on the affected trees by using :— $\frac{3}{4}$ oz. Arsenite Soda.

2 lbs. Jaggery.

4 gallons water.

DAMAGED BEANS, PROBABLY CAUSED BY SOME SUCKING INSECT.

The cause of this has not yet been fully investigated.

LEAF MINER MOTH.

A common pest which does not cause any alarm as it does not appear to do any material damage.

EXPERIMENTAL.

Owing to the number of inspections carried out during the period under review and the time spent in connection with Mealy Bug, together with the number of days absent from Head Office on Inspection duty and ill-health, it will be realised that there has been very little time to devote to experimental work. Correspondence, publications, interviews, and attendance at local shows have also to be taken into account.

The following varieties were planted out into plots at the Scott Agricultural Laboratories in April—Jackson's, Kent's, Blue Mountain, Mysore and Mocha. The rains were most disappointing and much below the average, the casualties, however, were less than 1%.

The Agobiada system promises to be a great success, and when the last two adverse seasons are taken into consideration it is considered that it has passed through a severe test.

It has been observed that coffee trees trained on this system or on the capping system withstand hail storms better than trees on the single stem. The extra number of "uprights" act as a protection to the crop, and the tree in general is not severely scarred by the hail stones. There is still a great deal to be learnt about these methods as conditions vary considerably in different districts.

The stumping of old coffee trees and allowing two to four shoots to grow from the stump promises to prove successful. It is proposed that trees trained in this manner should be pruned on the Central American lines. Experiments are also being carried out by training two shoots from the stump and capping these shoots at waist height to encourage four heads to grow from the cap.

SHADE.

Very little time has been devoted to shade experiments owing to other duties which had to be carried out.

Some observations, however, were made in connection with the use of *Sesbania* as a temporary shade.

(1) On some estates this tree was used when it appeared to be unnecessary to establish temporary shade as the general climatic conditions were not detrimental to the growth of coffee.

(2) Cases were noticed where *Sesbania* would have been most beneficial, but owing to inexperience on the part of the grower on the question of shade regulation, detrimental results ensued. *Sesbania*, however, has given good results in areas where it was essential to have temporary shade and where it has been carefully treated.

(3) In the majority of cases the planting has been too close.

GENERAL.

Owing to an unfavourable season this year the estimated production for the 1925-26 crop is likely to be considerably reduced.

The size, quality, and liquoring of "Kenya" coffee has been disappointing; the bold sizes being very little larger than normal medium. This can be accounted for by the fact that the coffee has suffered from lack of rains, the shortage occurring at a critical stage of the development of the bean.

The output of "Buni" this year will be very great as compared with other years owing to the drought.

The year's average price for "Kenya" coffee in London was approximately Shs. 118/6 per cwt, this would be approximately Shs. 101/6 per cwt, local value. The stock of mild coffees in London at the close of the year was rather above the average, yet on the other hand the stock of similar coffees was less than usual on the New York market. This might tend to maintain the value of coffee at its present level.

The World's visible supply is approximately 5,000,000 bags and with prospects of a moderate Brazilian crop in view, the statistical position of the article is good.

The shortage of Labour has been very acute on the whole, and wages have risen. In some districts this shortage has restricted developments. It has been noticed that more labour-saving devices are being used, nevertheless there is still room for improvement on many estates.

In August I paid a visit to the Coast area to inspect and report on the possibilities of growing certain varieties of coffee there. A report on this visit has already been submitted to you.

A. D. LE POER TRENCH,

Senior Coffee Officer.

APPENDIX "J".

REPORT OF FLAX OFFICER.

It is regrettable to have to report that the past year has been one of waning interest in the flax industry of this Colony. The acreage under the crop and the output of fibre has dropped to a very low ebb indeed. The failing demand in European markets owing to greater quantities of Russian flax becoming available at reduced prices together with the higher wages and shortage of labour have ceased to make the production of flax in Kenya, a paying proposition.

Flax growers are now turning their attention to the production of food crops such as Maize, Wheat and Barley with which less labour difficulties arise and which are therefore more remunerative.

In view of the above circumstances it will be understood that my report under the following heading must necessarily be short.

STAFF CHANGES :—

There were no changes in this section of the staff during the year, all duties in connection with flax being carried out by the undersigned.

TRAVELLING.

I was absent from my headquarters, Nakuru, on duty a total of 198 days during the year and travelled 6867 miles by car. Travelling by rail was undertaken where a saving in expenditure could be effected.

The cause of what appears to be excessive travelling is explained by the fact that the several districts in which flax was produced are situated long distances apart, and therefore satisfactorily to operate the grading of Flax Rules 1925 (Compulsory Grading) it was necessary to visit a number of grading centres at regular intervals in order that the output of fibre be inspected and certified for export.

The running in the Nakuru area in connection with the maize seed selection and two trips to the Trans Nzoia re-wheat selection are included in the above.

CORRESPONDENCE.

The official correspondence in connection with flax and other agricultural subjects amounted to 621 inward and 682 outward letters, the analysis of which are as follows :—

Grading	...	...	...	181
Advisory	...	...	...	126
General	...	...	...	133
Miscellaneous Agricultural matters	...			242

In addition to the local correspondence a large number of letters from authorities in Europe and America were received and dealt with. The exchange of views on the many points raised has proved of assistance generally in the course of my advisory duties to flax growers in Kenya.

WORK DONE.

At this stage it is necessary to state that from the 1st January to 14th June the grading of flax was carried out under the "voluntary" grading scheme which has been in operation for some years past, but on the 16th of June, "The Grading of Flax Rules 1925" (a form of Compulsory Grading) came into force and remained in operation throughout the period covered by this report.

From 1st January, to 14th June, $10\frac{1}{2}$ tons of flax and $9\frac{1}{2}$ tons of tow were graded under the old scheme and from 15th June, to 31st December, 86 tons of flax and 77 tons of tow were dealt with according to "The Grading of Flax Rules 1925" making a total of $96\frac{1}{2}$ tons flax and $86\frac{1}{2}$ tons tow graded and duly certified during the year.

The amount of revenue derived from this service was Shs. 3744/59. There was no alteration in the Grading fees from the previous year which remained at Shs. 30/- per ton for flax and Shs. 10/- for tow.

Advisory services were rendered as necessary throughout the year concurrently with the grading and classification work, as well as by correspondence.

Instructive flax exhibits of interest to the public generally were prepared and exhibited at the Nairobi Agricultural and Horticultural Society's Show in July, and also at a similar show held at Nakuru.

In addition to my ordinary duties several Coffee Plantations convenient to flax areas were inspected and reported on as directed.

The selection of maize which was begun in 1924 for the purpose of improving the type at present used for seed, was continued and extended over a wider area than last year.

The farms on which selection was carried out, district, number of plants selected, etc., are as follows :—

Owner of Farm.		District.	No. of individual plants selected.
G. C. Oakes, Esq.	...	Njoro ...	2,000 plants.
C. Cranswick, Esq.	...	Solai ...	1,200 „
J. E. Wolryche-Whitmore	...	Rongai ...	1,500 „
Jas. Mackay, Esq.	...	Eldama Ravine ...	3,000 „

As will be seen, the above districts are representative of the greater part of the Nakuru maize growing area. Already a good foundation is established from which a vastly improved type of higher yielding qualities should result if the selection is continued.

Owing to a serious outbreak of rust in the most important wheat growing area in the Trans Nzoia selection of the apparent rust resisting varieties was begun and continued throughout November. An approximate total of 11,000 individual wheat plants were selected and classified, ready for planting in observation plots during the coming season. There is every reason to believe that this work will be attended by good results.

EXPERIMENTAL.

The work under this heading was practically confined to the propagation of the “J.W.S.” and “Saginaw” pure line pedigree flax seed, which was imported in 1924 from the Linen Research Association, Belfast, and the Wisconsin Experiment Station, U.S.A., respectively.

Owing to the very dry season it was considered best to postpone planting until the rains proper had set in in order to avoid risk of failure or loss of these valuable strains.

Planting took place during October which was very late indeed, but it is satisfactory to note that the action taken was justified, as at time of writing the plots look very healthy and will give a good yield.

REMARKS AND CONCLUSIONS.

Flax growing in Kenya is no longer an experiment. It has been proved over the past nine years.

There is no doubt whatever that good flax of excellent quality can be produced in the Kenya Highlands at altitudes over 7,000 feet.

There is ample proof that flax growing is a profitable pursuit under normal conditions.

The cause of the dwindling state of the industry to-day is without doubt the high cost of production.

It is a matter of extreme regret to have to record that at the end of nine years, Flax growing in Kenya is now practically dead. There is not the slightest doubt that the chief cause of failure has been due to (a) the increasing shortage of Native labour; (b) the absolute impossibility of obtaining an extra seasonal supply for harvesting and retting; (c) the steadily increasing rate of wages, (now almost double that of three or four years ago) which it is necessary to pay for a much lesser quantity of work per day.

It is therefore obvious that with the less efficient and very limited labour supply, and the excessive wages, we are unable because of the increased costs of production to market our flax at a price, which to other countries is profitable.

G. M. HAMILTON,
Flax Officer.

APPENDIX "K."

REPORT

OF

GRADER AND INSPECTOR, MOMBASA.

STAFF CHANGES.—

Mr. A. R. Teague, Grader and Inspector, proceeded on leave in June and subsequently resigned his appointment.

Mr. F. B. L. Butler was appointed Acting Grader and Inspector and was stationed in Mombasa from 1st October.

Mr. B. F. Ratcliffe, Junior Clerk, proceeded on leave on 31st October and was relieved by Mr. J. Riddell, Clerk.

PLANT IMPORTS.—

The following plants and seeds were imported into the Colony and Protectorate during the year :—

Description.	No. of Packages.	Declared Value.	
		Shs.	C.
Tea Seed ...	1159	121,075	00
Fruit Trees ...	221	27,684	36
Garden and Farm Seeds ...	936	24,550	76
Apples ...	449	12,749	30
Plants ...	208	6,221	29
Bulbs ...	128	3,432	62
Tree Seed ...	20	1,360	00
Total	3121	197,073	33

In addition to the above 130 packages were passed in transit to Uganda. Five parcels valued at 33/- were imported without the necessary certificates from the countries of origin and were destroyed.

EXPORTS.

Maize Grading and Conditioning Services.

The attached table shows the number of bags graded during 1925 together with their grades.

The total is some 70,000 bags less than in the previous year the principal falling off being in the Native Maize. This was due to two reasons, the smaller amount in excess of the countries needs available for export and the greater market for ungraded Maize at various Somaliland Ports, altogether during the year 100,000 bags being exported under Rule 25 very little of which was graded.

In spite of the smaller quantity graded there was an increase in the quantity of wet maize particularly during the first three months of the year the proportion of wet maize increasing from 5·2% to 7·7% of total graded.

The following table shows the quantities of wet maize received from the various districts together with their moisture contents :—

Origin.	No. of Bags.	Av. Moisture Content.
		%
Kisumu ...	... 11,694	15·3
Thika ...	... 4,764	15·2
Coast ...	... 153	.....
Fort Ternan ...	... 281	15·8
Lumbwa ...	... 2,070	15·5
Moshi ...	... 2	.....
Escarpment-Kikuyu ...	... 1,371	16·8
Eldoret ...	... 512	15·1
Njoro ...	... 4,099	15·3
Nakuru ...	... 5,908	14·8
Londiani ...	... 542	15·1
Naivasha ...	... 330	15·3
Elburgon ...	... 8,332	16·2
Turbo Valley ...	... 15	.....
Kibigori ...	... 260	15·6
Wet by Rain ...	... 7,671	.....
Total	... 48,004	.....

RE-BAGGING.—

During the year 3993 torn and unserviceable bags were replaced by the Uganda Railway. In addition, 3623 bags have been rebagged entirely and 2314 in part by the owner before grading.

8,800 bags were insecurely sewn and were resewn by the Uganda Railway or by the Owner. In addition, trucks containing 1,140 bags were resewn entirely and 2,270 resewn in part by the owners prior to grading. This does not include a quantity of Maize bags resewn at M'baraki by the owner before inspection by the Grader of which quantity there is no record.

GRADING OF MAIZE RULES 1925.

A new edition of the Maize Grading Rules was published and came into force on 1st November.

The principal alterations from the original Rules were :—

- (a) Restricting the type of bags to be used to A twill (8 × 8 porter and shot).
- (b) The prohibition of the export of weevily maize (though not slightly weevily).
- (c) The reduction of maximum moisture content from 14% to 12½%.
- (d) To facilitate the checking of the weights of the bags it was made lawful for the Administration of the Uganda Railway and for the Inspector to determine the weight of a consignment of maize by weighing 10% of the number of bags presented for grading.

The description of the Grades in Schedule was altered to conform more nearly with the South African Grades.

Amongst other changes a new third grade of flat white was introduced, with a slightly weevily subgrade and Grades six and seven were combined in one grade "Mixed."

WEIGHTS.

During the six months July—December the Uganda Railway undertook to weigh 10% of the bags in each truck.

Where the average weight of the bags weighed was found to be less than 202 lbs. gross the whole truck-load was rejected. This resulted in 81 truck-loads of maize containing 14,795 bags being rejected before grading. Part of this was removed by

the owners from the sheds, the underweight bags were filled up to the correct weight and the maize was again presented for grading.

The remainder was either sold locally or shipped to African Ports except on occasion where it was found possible to block-stack the short weight bags of individual shippers separately. In this case the question of weights was waived provided that it could be shown that the Maize was not changing hands after grading but was being sold to the account of the original owner at the port of destination.

EXPORT OF BEANS.

4,210 bags of beans were inspected during the year and 14 Export Certificates were issued at a charge of Shs. 280/-.

EXPORT OF POTATOES.

5,937 bags of potatoes were shipped to Bombay and Durban for which 44 Certificates of freedom from Wart Disease (*Synchytrium endobioticum*) were issued free of charge.

MAIZE CONDITIONING PLANT.

The erection of the Maize Conditioning Plant was started in May and the Plant was ready to accept Maize for drying or for the destruction of weevils by 1st November.

Preliminary tests were carried out in October with 30 tons of wet maize lent by Messrs. Hasham Jamal and Co. and The Twentsche Overseas Trading Co. with satisfactory results.

2,924 bags of wet maize were conditioned and 501 bags of weevily, producing a revenue of Shs. 2,055/-. Owing to the ready market for rejected maize at various coast ports this total of 3,425 bags conditioned only amounts to 53% of the wet and weevily maize rejected during the two months that the plant was working.

FLAX.

The compulsory grading of flax and flax tow came into force on 14th May. Since that date 31 Export Certificates covering 418 bales of flax and 488 bales of tow were issued here after inspection as required by the Grading of Flax Rules 1925.

C. C. T. SHARP,

Grader and Inspector.

1925.

MONTH.	K1.	K2.	K2 SW.	K3.	K3 SW.	K4	K5.	K6.	K7.	K8.		Total Graded.	WET.	MY.	WL.	O C.	Total Rj'd.	GRAND TOTAL.
										S.W.	F. W.							
January	...	44,037	4,754	...	...	27	106	1	585	17,638	5,039	72,217	15,896	5,057	5,024	450	26,427	98,644
February	...	64,469	3,675	...	...	1,302	468	...	282	20,670	17,729	108,595	15,344	4,627	6,160	43	26,174	134,769
March	...	83,496	6,170	...	...	863	...	...	175	11,971	6,876	109,551	4,223	575	2,137	63	6,998	116,549
April	...	44,178	2,547	...	...	4	...	...	...	1,461	2,719	50,909	988	14	372	20	1,394	52,303
May	...	20,065	1,243	...	...	...	...	...	34	2,092	1,902	25,336	1,070	24	559	18	1,671	27,007
June	...	39,954	2,037	...	...	...	...	...	...	1,217	2,369	45,577	1,407	68	1,774	15	3,264	48,841
July	...	14,580	1,976	...	...	...	...	...	...	1,385	1,253	19,194	382	4	278	4	668	19,862
August	...	13,783	924	...	...	...	...	...	...	688	2,066	17,461	145	78	2,152	64	2,439	19,900
September	...	7,006	1,879	...	...	...	...	...	7,444	1,123	1,530	19,982	1,402	583	4,247	6	6,238	26,220
October	...	3,176	7,530	...	...	...	...	...	12,691	1,081	151	24,629	1,444	3,272	949	552	6,717	31,346
November	226	5,675	6,294	388	94	...	...	...	4,543	2,205	6	19,431	1,895	505	291	1,348	4,039	23,470
December	...	4,163	3,445	381	5	...	...	...	164	6,530	481	15,169	3,808	638	448	945	5,839	21,008
Total	226	344,582	43,474	769	99	2,196	574	1	25,918	68,091	42,121	528,051	48,004	15,945	24,391	3,528	91,868	619,919

APPENDIX "L."

REPORT OF THE AGRICULTURAL SUPERVISOR, SCOTT AGRICULTURAL LABORATORIES AND SOUTH KIKUYU.

(a) *Staff Changes.*

Mr. Spranger took up duty here on 1st December. The writer sailed to England on leave on 26th December.

(b) *Travelling.*

3,160 miles by motor car. Throughout the year 108 days were spent in the Reserve.

(c) *Correspondence.*

Inward letters, 215. Outward letters, 255.

17 letters were advisory (not including enquiries from Government Departments nor on native agriculture).

(d) *Reserve.*

1. *Barazas and Demonstrations.*

Kyambu and Mukinyi Reserve	...	52
Dagoretti	... ..	41

2. *Work in connection with Missions.* Throughout the year there has been a growing desire amongst missionaries to get help on agricultural questions and every opportunity has been taken to assist them in any way possible.

A considerable number of lantern lectures were given in mission schools.

3. *Demonstration Native Shambas.* Twenty-eight demonstration shambas were made and planted at various points in the Reserve. Various methods have had to be adopted to suit the prevailing conditions and the needs of the natives. Some were on the rotation of crops system and could be adapted to the individual needs of the natives of each district.

Where land was more plentiful and where the natives could make communal shambas of four to twelve acres in size, we invariably worked on one crop throughout so that comparative results could be easily seen.

Apart from the above systems a great deal of work has been carried out on the shambas which were being worked by the natives themselves.

(a) General improvement in methods and seed.

(b) Part of each garden dug and planted under our direction.

No fixed method of instruction was applied, but the needs and conditions of each location were fully considered before work was begun.

One method of getting in touch with the natives was by the Native Agricultural Instructors visiting the native markets which are held every 4th day at each market place. There is always an abundance of material at hand and it is an easy method of conveying practical lessons on selection of seed and such like subjects.

There is always a typical native shamba at these Laboratories and natives were invited to come and see it.

4. *Reserve Conditions.* The conditions in the Reserve are progressing favourably. The improvement in the number and quality of the roads has greatly facilitated and encouraged transport of produce. There are quite a number of native owned ox carts and one native owned motor waggon. The number of water driven posho mills has increased and will continue to do so.

5. *Grazing.* There has been a general shortage of food for the stock during the Summer on account of the drought. The greatest need was observed throughout the Location of Chief Karanja. This can in part be explained by the growing earning capacity of the natives, while at the same time they are unable to leave their old methods of buying fresh stock with surplus cash. Even under ideal climatic conditions the district is overstocked with cattle, goats and sheep much above the carrying capacity of the grazing. When the introduction of water to the Ndeiya country takes place there will be a temporary relief throughout.

6. *Stock.* This may still be considered the outlet for surplus cash in the Reserve, and until such time as the natives become educated to fresh methods of spending and saving there will be a growing increase in the number of cattle, unless checked by disease or other causes.

There is a greater desire amongst the Kikuyu to eat meat but it is too slow to appreciably reduce the herds.

7. *Ghee.* The output of ghee is still practically nil.

8. *Trees.* In many of the locations there is now an abundance of timber for the ordinary needs of the natives. The higher areas over 7,000 feet are the most barren, and a great deal more has to be done to encourage tree planting. These high and cold places would benefit greatly if the natives could be persuaded to plant timber in the form of shelter-belts.

In all elevations the natives have been asked to select ground which is useless for cultivation and grazing, and to plant it up with trees.

It is also desirable that they have their trees in proper sylvicultural order, and if Black Wattle is still planted there will be a good quantity of bark produced which has a ready market.

9. *Maize.* This has been the chief crop throughout the Reserve. During the year every opportunity was taken to instruct the natives in selection of seed. There was a vast improvement throughout, and some locations are now almost free from coloured, low-yielding types. The women do all the planting and until a greater interest is taken in the work by the men, we shall be greatly retarded in our efforts. It is most difficult to change the ways of the overworked women.

The crop from the Short rains of 1924-1925 throughout the district was much above the average, but the crops reaped from the Big-Rains-season of 1925 were a failure. In spite of the drought, our demonstration shambas yielded excellent crops, and those of the few natives who carried out our instructions implicitly. Unless rainfall is plentiful the prevailing methods of cultivation are useless.

10. *Wheat.* Practically all the natives in the reserve are very anxious to try wheat now. It is not desirable that they plant out too much of it till we can prove the varieties most suitable for the conditions.

It is unfortunate that the natives in the elevations of 7,000 feet and over are not so anxious to try wheat as those in the lower altitudes.

11. *Linseed*. Experimental plots were planted in the higher elevations in July. When examined in December the crops were most encouraging. Yields will be taken in due course and if everything is satisfactory, linseed will be encouraged strongly in the cold isolated districts where wild pigs are so bad.

12. *Beans*. An important crop in all elevations of the Reserve. Large quantities are planted, and in isolated places very good samples have been grown. Most of the natives continue to plant and harvest mixed types and as long as the Indian stores continue to buy such inferior samples the work will be retarded considerably.

13. *Markets*. Apart from the Indian stores and the native markets, the European farmers have been ready buyers of maize for their labour, and vegetables for their own use. English potatoes were grown in large quantities around Uplands and Limuru where the climate is most suitable and the Railway close at hand.

14. *Seed Issues in the Reserve.*

Maize, Flat White	...	...	27,204 lbs.
„ White Congo	...	...	133 „
„ White varieties for trial	...	...	70 „
Beans	...	...	1,843 „
Bombay Linseed	...	...	28 „
English Potatoes (British Queen)	...	...	100 „
Millet (Boer Manna Special Selected)	...	...	293 „
Wheat	...	...	2,008 „
Buckwheat	...	...	37 „

15. *General*. The “Githaka” or land ownership system is not always an advantage. There has often been great difficulty found by the poorer natives in getting sufficient land to cultivate. As a general rule these natives have to beg the landlords to allow them to use small pieces of land. The result is that the greater number of the tenants have several shambas, each scattered over a large area and not near the home. Very heavy loss is caused by the time spent in walking to and from the shambas, they are unable to care for them properly, birds and stock do a great deal of damage and generally the larger proportion of the natives remain downtrodden.

A great proportion of loss has been caused in the past through a lack of organisation in selecting shambas. Grazing

areas, trees and shambas are mixed up and while children have to look after the herds, the stock will always wander in amongst the crops whilst the children are at play.

There is a large variety of food crops grown, all which are of economic value and suitable to the districts where grown, have been encouraged. Some unsuitable crops have been discouraged.

A number of locations have not been worked to any extent. Three in the higher Chania area have been left out for lack of time to safari the district. Other locations which are lower or nearer have failed to pay any attention to advice given and have given us no encouragement. There was so much to do in other locations where the natives were more willing to act and try, that the more conservative and superstitious natives will first have to show some tangible sign of eagerness to follow our methods before any real work can be expended on them.

There has been a very decided improvement throughout the Reserve, more especially in the higher bush land where the natives simply cleared the bush then planted. During 1925 a large proportion of the shambas were dug before being planted which was very rarely done in years past.

A great deal of assistance was given by the Administrative Officers at all times in encouraging the natives to try better methods. It has also been noticed that the natives are more pliable as a result of the administrative influence in past years and this has very considerably assisted in the general rate of progress. Mission natives are also more easily convinced than heathens, and endeavour to follow out our suggestions.

By using trained native agricultural instructors much of the detail has been undertaken by them and has naturally allowed a greater area to be thoroughly worked.

The general advancement throughout the Reserve in agricultural methods is progressing at a much more rapid pace than was possible some two years ago.

E. WORK DONE AT SCOTT AGRICULTURAL LABORATORIES.

1. INSTRUCTIONAL.

NATIVE AGRICULTURAL APPRENTICES.

The number of apprentices in residence has been kept up to 43 boys.

During the year 10 apprentices completed their full training and most of them have been posted to duty in the Reserves.

School work.—All apprentices attended school for two hours every day unless any exceptional planting or harvesting had to be completed within a limited period.

During the last four months of the year it was found necessary to hold evening classes on three nights a week. Subjects: Writing and reading in Kiswahili and English, Arithmetic and Geography. Every endeavour has been made to make the Schooling as practical as possible.

Class.	School.	Agricultural Lectures.	Agricultural Demonstrations.	Practical Agriculture.
Senior ...	132 hours	75 hours	32 hours	} All time other than that taken up in school was spent in field work.
First ...	428 „	113 „	43 ... „	
Second ...	510 „	113 „	43 ... „	
Junior ...	493 „	...	...	
Evening Classes ...	52 „	2 lantern lectures.	...	

Nearly all the work done on the experimental land was carried out by the apprentices. There was a great variety, and each boy had the opportunity to gain a very general knowledge of all subjects pertaining to agriculture.

Every boy, before leaving the school, had to acquaint himself with such work as digging, planting, ploughing, carting, nursery beds, sowing all types of seeds by suitable methods, harvesting a general variety of plants, calculating yields per acre, roadmaking, plotting shambas, applying manures, entomological work, etcetera.

Classes.

To facilitate teaching it has been found necessary to increase the number of classes to four. The boys in the Junior class received no agricultural lectures. The subjects undertaken during the year embraced: Rotation of crops, maize, cotton, beans and other important crops; methods of planting various crops; method of testing suitability of crop to district; implements and

care of same; poultry, cattle, goats and sheep; diseases and insects injurious to economic plants; formation of soil; identification, formation and preparation of soils for crops; sylviculture; simple botany as applied to identification of economic plants.

Gardens.

Each apprentice has a garden 1/20th of an acre in size, which he has to plant and care for during his own time. Their energies and capabilities in this direction have much exceeded expectations. These gardens have proved a valuable asset in that a boy's knowledge is more easily gauged, and his progress followed, than would otherwise be the case. The individual gardens were judged periodically during each season and prizes awarded.

2. EXPERIMENTAL.

Maize.

2½ acres of Special Selected Kenya Hybrid Flat White were planted. The yield was not determinable due to the uneven soil and consequent irregular stand, while the rainfall was below a possible amount for this long period maize. The standing crop was examined and stems selected. These were harvested separately and will undergo further selection. The remainder of the crop was cob selected.

Variety Maize Plots.

Seven varieties were sown under similar conditions and observations made on them from time to time. Weighings were taken of yield per acre of each variety.

Sunflowers.

Black Russian Mammoth	990 lbs per acre	32 lbs per bushel.
Striped „ „	930 „ „ „	30 „ „ „

The Plantation was 2.40 acres in extent.

Both varieties appeared to enjoy the drought and suffered no bad effects from it.

Very careful seed selection was made of each variety and the seed kept for issue.

Flax.

J. W. S. Pedigree from Belfast.	} These two varieties were sown
Saginaw from America.	

rather late in the season and had to grow throughout the

drought on just under 4 inches of rain. The former developed a normal crop while the Saginaw was rather a failure. Copies of charts attached.

Linseed

Two varieties were again tried to ascertain the advisability of further multiplication and issue. The results gained in 1924-1925 were not encouraging and in 1925 they were a complete failure as will be seen by the following chart :—

NAME	YIELD PER ACRE.		REMARKS
	1924-25.	1925	
Abyssinian Harar ...	860 lbs.	240 lbs	} Withstood drought badly in 1925,
Abyssinian Addis Ababa	1,157 „	223 „	

Linseed—Bombay.

Seed received too late to be planted out during the Big Rains but was sown in small plots in the South Kikuyu Reserve at elevations over 7,000 feet, and when inspected in December appeared most encouraging. A plot was sown at these Laboratories in November, results of which will be reported in due course.

Green Manure.

A collection of 47 varieties of plants was made which were thought to be suitable for green manuring puposes. These were planted out in small plots in November. Their values will be estimated in due course in collaboration with the Agricultural Chemist.

Manurial Plots.

Work was commenced on a series of manurial plots for the Agricultural Chemist.

Grass Plots.

During the last two years indigenous grasses have been collected from various places and planted in small row plots for examination and identification. The latter work was done by Kew Gardens through the Mycologist here.

From this collection a selection of 30 varieties was made which were thought to be best suited for forage puposes and

were planted out in 1/40th. acre plots where they will be subjected to further trials in due course.

Fibre Plants.

A collection of indigenous fibre plants was made and will be added to from time to time. There are now 20 varieties planted in small row plots, a number of which have been indentified by Kew Gardens.

Coffee variety Plots.

Half-acre plots were planted of each of the following varieties, and several varieties and systems of shade trees were introduced. This work was carried out under the direction of the Senior Coffee Officer.

(1) Kent's, (2) Jackson's, (3) Blue Mountain, (4) Mocha and (5) Mysore.

They were planted out during the big rains and though the drought was severe there were no deaths caused by it. Cutworms caused a very small percentage of loss. The plantation may now be considered as established.

Shade trees for Coffee.

A small plantation has been started with a collection of trees and shrubs which may be useful as coffee shade.

Kikuyu Grass. (*Pennisetum clandestinum*).

A small area was planted out with the object of testing out several clovers and grasses in mixture with Kikuyu Grass. These were not too successful in the drought, and it was thought advisable to discontinue investigations.

Wild Silk Plantation.

Bridelia micrantha for Anaphae Silk Nests of pupæ were introduced in October.

Seeds and plants from Abroad.

Paraguay Palm (*Acrocomia sclerocarpa*)

Seeds were received from Paraguay, and planted in the seed beds immediately. Some were very carefully shelled before planting out but were unfortunately eaten by red ants before the work of these marauders was observed. The remainder of the seed has now been in the beds for nine months and show no signs of activity. (The seeds may take anything up to two years to germinate).

Yerba Mate. (*Ilex Paraguayensis*).

A small quantity of the seed was received from the Amani Institute and planted in the seed beds here. Before planting the seed was treated by the understated methods with varying results. Many of the seedlings have been issued to settlers throughout Kenya in bathes of six plants.

1. Planted direct into bed, no treatment. Full germination in 6-8 months.
2. Buried in a hole for two months prior to sowing. Full germination in 5 months.
3. Heated in water to 80° C prior to sowing. No germination.
4. " " " " 94 " " " " "
5. " 1 minute " " 94 " " " " "
6. " 3 " " " 94 " " " " "
7. Soaked 7 hours in 3% Hydrochloric acid at blood heat. Full germination in 6-8 months.
8. Soaked 20 hours in 3% Hydrochloric Acid at blood heat. No germination.

It will be noticed that no advantage was derived from the Hydrochloric Acid treatment. The burying method could be extended and less time would then be taken in the seed beds before germination.

Chinese Lucerne.

Four ounces of seed were received from South Africa. A small quantity was sown out and germinated well.

Pita Plant.

Received from Kew Gardens in 1924. Growth is very slow.

Hops.

25 roots were received from South Africa in 1924. They are making no progress in growth. Two plants were tried at Uplands without result.

Peachmond.

Seeds were received from Mexico in 1924. The young plants have now been transplanted to the Orchard.

Other Seeds and Plants.

A big variety of plants were grown during both seasons for multiplication, instructional work and other purposes.

Seeds and plants sent Abroad.

Grasses.—A selection was sent to the Agricultural Instructor New Zealand.

Kikuya Grass.—Rhizomes sent to India and Uganda. 9 samples of seed sent to various parts of the world.

Maize.—1 sample sent to Tanganyika.

Vegetable Seeds.—1 collection sent to Sudan.

3. LABORATORY AND GENERAL.

Buildings.

The buildings are in moderately good repair. Minor alterations have been made to fittings when required.

Camp for Apprentices.

This is most unsatisfactory and will be required to be rebuilt with permanent materials before entire satisfaction is attained. During the year the buildings required continual repairs.

Experimental Land.

The condition of the land is greatly improved as the result of continued cultivation and manuring. There was a distinct shortage of space and crops had to be somewhat cramped. The difficulty was most pronounced where maize of several varieties had to be multiplied.

25 acres of fresh land has been temporarily handed over for our use by the Education Department, and has been planted with wheat.

W. LYNE WATT,

Agricultural Supervisor.

CHART No. 1, MAIZE VARIETY PLOTS. Scott Agricultural Laboratories 1925.

Number.	Name.	Description.	Planted.	Harvested.	Period on land.	Rainfall during period on land.	Yield per acre.	REMARKS.
1	Wisconsin No. 8 ...	Yellow Horse Tooth Dent.	23/4/25	23/9/25	153 days.	5'18 ins.	2,000 lbs.	Medium stand. Local seed.
2	Yellow Congo ...	Yellow Flint...	"	12/10/25	173 "	5'25 "	600 "	Low stand. Introduced seed.
3	Eureka ...	Yellow H.T D.	"	"	" "	" "	1,400 "	Medium stand. do.
4	White Congo ...	White Flint ...	"	"	" "	" "	2,000 "	Low stand. Local seed.
5	Potchefstroom Pearl.	Flat White Dent.	"	28/10/25	195 "	6'26 "	1,600 "	High stand. do.
6	Kenya Hybrid ...	do. ...	"	"	" "	" "	1,920 "	Do. do.
7	Kenya Hybrid Special Selected.	do. ...	"	2/11/25	200 "	6'34 "	3,360 "	Very high stand. Big show of stem & leaf. Local seed.

a. Area of each variety 1/13 acre.

b. Area of each average plot weighed 1/160 acre.

c. The outstanding feature of the plots was the growth of No. 7 "Special Selected Flat White." After germination the seedlings showed a sturdy growth and continued to enjoy the drought conditions.

CHART No. 2.

FLAX EXPERIMENTS, 1925.

Name and Origin.	Date of Sowing.	Date of Harvesting.	Growing Period.	Rainfall when Growing.	Area Sown.	Average Height of Straw.	PER ACRE.		
							Weight of Deseeded Straw.	Weight of Deseeded Retted Straw.	Weight of Seed Harvested.
Signaw American Pedigree ..	24-4-25	7-9-25	137 days	3.98 ins.	.352 acre	33 ins.	1,165 lbs.	860 lbs.	132 lbs.

REMARKS :—Some rain fell before sowing. Moisture was brought up to the surface by rolling. This variety appears to require an average rainfall before it will flourish. Average height of straw 33 inches.

CHART No. 3.

FLAX EXPERIMENTS, 1925.

Name and Origin.	Date of Sowing.	Date of Harvesting.	Growing Period.	Rainfall when Growing.	Area Sown.	Average Height of Straw.	PER ACRE.		
							Weight of Deseeded Straw.	Weight of Deseeded Retted Straw.	Weight of Seed Harvested.
J. W. S. Pedigree Flax Seed K. Belfast ..	24-4-25	28-8-25	127 days.	3.95 ins.	.352 acre.	36 ins.	1,700 lbs.	1,280 lbs.	213 lbs.

REMARKS :—Some rain fell before Sowing. Moisture was brought up by rolling. The crop remained healthy throughout the growing period and attained an average height of 36 inches. This variety appears to survive drought well.

APPENDIX "M"

REPORT
OF
SENIOR AGRICULTURAL SUPERVISOR, COAST

STAFF.

The staff under my control for the year was as follows:—

Mombasa	...	1	Native Instructor		
		1	Office Orderly		
Malindi	...	2	Agricultural Apprentices (Swahili)		
		1	Part-time apprentice		
Kilifi	...	3	Agricultural Apprentices		
				(Wagirima.)	
Digo	...	2	„	„	(Swahili.)

Development undertaken during the year has necessitated an increase in native staff. Considerable difficulty has been experienced in obtaining suitable applicants as it is essential that only those possessing an aptitude should be engaged. Agricultural Instructors and Apprentices must be able to read and write that they may receive written orders and keep diaries, and few applicants other than mission boys have proved suitable.

Instruction to these boys has been limited, as it has only been imparted when I have visited their particular areas. For the training of an adequate staff of trained native instructors, it is essential that a training school be established in the Coast area, or that Coast boys be trained at the Scott Agricultural Laboratories or the Bukura Farm for a period of three years or more. In the existing circumstances the progress made by these boys in acquiring a knowledge of their work and of giving instruction in the Native Reserves has been fairly satisfactory, but I am confident that the adoption of my recommendations above will increase the general efficiency to a marked degree.

2. WEATHER AND RAINFALL CONDITIONS.

Short rains 1924.

At no period throughout the year may the rainfall be described as normal. Good crops of maize were reaped in

March owing to the exceptionally favourable rains which continued throughout January and February instead of ceasing in December. A period of eleven weeks dry weather followed; and the Long Rains due the first week in April were seven weeks late.

Long rains 1925.

From July onward when dry weather is usual, showers continued until September when the short Rains commenced. Thus there was no definite dry period between the Long and the Short Rains.

Also while sufficient near the sea, the Long Rains were not adequate in the hinterland, and the majority of the crops failed east of a line twenty miles from the sea.

Short Rains 1925.

The rainfall in October was favourably (9.11 inches Mombasa); but the Short Rains were of very brief duration. In the previous year they continued throughout November and December and up to the end of February as noted above; but this year no rain was recorded from the beginning of November onward, which was disastrous for the cotton and maize crops. Drought was experienced in December and the Short Rains crops will fail utterly in locations more than 15 miles from the sea.

Sufficient rain fell during September and October to mature the crops on demonstration shambas where precautions were taken to conserve the moisture by means of deep cultivation, at Samburu and elsewhere. This was in marked contrast to the native shambas which were absolute failures.

The distribution of the rainfall has been most erratic, and no surprise need be occasioned if members of the native population engaged in agricultural pursuits do not thrive amid such unreliable weather conditions. Exceptionally high winds prevailed in July and early August and losses to shamba owners in the vicinity of the sea were exceptionally heavy. Many holdings being completely destroyed by the winds, were abandoned.

Graph of rainfall of Mombasa, Malindi, Kilifi, Sokoki, and Gazi is attached (Appendix 1).

3. TRAVELLING.

I travelled 3219 miles by motor car during the year, and my work in the Native Reserves occupied 210 days.

Owing to the bad state of the so-called roads, travelling is exceedingly slow and wearisome.

4. CROPS.

For list of seeds issued see appendix 2.

MAIZE.

Long Rains,—Good yields were reported from locations within 20 miles of the sea, and in the Sabaki River area. Elsewhere yields were low.

Short Rains—In nearly all parts results from these crops will be very poor except in a few very low lying portions of the Sabaki River flats, where a fair yield is expected.

General — Despite the failure of crops in many inland locations for both planting seasons, an increase in exportable surplus is recorded (ref. appendix 3).

Prices paid for maize have ranged from twelve or thirteen pichies for Shs. 2/- at Ganzi and Kaloleni in September and October, to three pichies at Kinango in the Digo District from August onward. (pichi = 6 to 7 lbs).

COTTON.

Cotton seed was distributed in the following districts:
Malindi, Mambrui, Kilifi, Tukaungu, Mombasa.

Owing to the failure of the Short Rains the output of cotton for the year has proved disappointing. The prospects of the Malindi and Mambrui crops were exceptionally good up to the end of November, and considerable quantities of cotton were coming in. Complete drought was experienced in November and December, however, growth was checked, and the main pickings due in December were an utter failure, the close of the year yielding only 150,000 lbs. of seed cotton as against 225,000 lbs. anticipated.

Unfortunately the fall in price from Shs. 7/- to 6/- per frasila (36 lbs.) for No. 1 quality cotton caused considerable discontent, and in consequence I do not anticipate extended planting in 1926.

Seed cotton sold to ginnery owners during the year realised :

			Shs.	
Malindi	...	...	6,000	..
Mambrui	...	...	20,000	
Kilifi	...	...	3,350	

At present there are only two ginneries in the Coast area, one being at Malindi and the other at Kilifi. The ginnyery at Malindi can handle 150,000 lbs of seed cotton in 30 working days, and it will be seen therefore that unless the production of cotton is increased by at least 300-400%, a second ginnyery there cannot be supported.

The Powysland Sisal Estates, (B.E.A.) Ltd., undertook to erect a ginnyery and to handle the crop at Kilifi but so far this has not been done.

I do not anticipate that the cultivation of cotton will be taken up in the Mombasa District to any appreciable extent, as labour is so highly paid, and good revenue is obtainable from coconuts. Moreover the sale of cotton is difficult owing to the fact that traders cannot be expected to take out Buying Licences costing Shs. 100 until the cotton available warrants that outlay.

COCONUTS.

Very few coconuts have been planted by Europeans during the year, though considerable areas from previous plantings are now coming into bearing. On the other hand native holdings have increased. No epidemics of disease were brought to my notice during the year.

Native and Arab copra is of very low quality yet finds a market at soap works in Mombasa which take the majority of the output of all copra produced.

Prices ruling during the year were :

Coconuts ...	...	Shs. 6/6 to 8/-
Copra ...	...	£25 to £27/10 per ton according to quality.

7. LIVESTOCK AND GHEE.

I am glad to report that during the year 1925 disease among livestock has been less prevalent than in 1924. Due to the scanty supply and poor condition of Machakos and Kitui cattle which supplement the meat supply of Mombasa, prices have risen.

Hides and skins have remained poor in quality, being sun-dried. Instruction in drying them in the shade has been given in many locations.

The livestock population in the Protectorate is very sparse, due to the presence of fly in areas formerly cultivated by slave labour. Even camels are scarce for the same reason.

The production of locally prepared ghee has been encouraged by an increase in price in Mombasa. The industry is now a thriving one around Mariakani where prices have ranged between Shs. 60/- and Shs. 70/- per frasila.

8. INSTRUCTIONAL WORK IN NATIVE RESERVES.

In addition to teaching given by members of the native staff to natives on their holdings, instruction has been given by means of barazas held actually on demonstration shambas.

As these barazas have been arranged when travelling with Administrative Officers good attendances have been secured. More than sixty barazas of this type have been held during the year.

Numerous requests for instruction have been received from missions, and special attention is now being given to this branch of the work. Native teachers at the mission schools in the reserves are far more intelligent and receptive than other sections of the population, and with their assistance, progress is being made among the adults and children by means of small plots at these centres. At the end of the year twenty-five demonstration shambas were established, the dimensions of which have depended upon the importance of the location and the facilities for maintenance.

The larger shambas are situated in the following locations :

Mission and other Schools : Ganda, Mambrui, Waa, Kalo-
leni, Kisumbi, Rabai, Mazeras and Ribi.

Other Centres : Ganzi, Takaungu, Kirwitu, Jibana, Maria-
kani, Mvumbo, Samburu, Vuga, Kinango, etc.

With the assistance of Administrative Officers, the help of natives living near these shambas was obtained for shamba maintenance during the early part of the year ; but owing to the unreliability of this form of labour it has been dispensed with, although I am none the less grateful to the Officers of the Administration for their assistance. For the furtherance of instruction these shambas must be kept absolutely clean and orderly, and paid permanent labour whose remuneration depends upon results has been found essential.

A few of the more enlightened elders are just beginning to appreciate the fact that there are lessons to be learned in connection with agriculture.

9. EXPERIMENTAL WORK.

For the purpose of obtaining information, seeds have been distributed to Europeans and trials of seeds conducted upon

demonstration shambas. While in the latter instance results have been fairly satisfactory, it is unfortunate that in the former case I am not in a position to report success.

10. NATIVE RESERVES.

As far as I have been able to observe, the native population is settled and contented, and the size of their shambas is increasing.

The planting of coconuts is extending very considerably not with a view to the production of coconuts, but almost solely for the tapping of tembo, which is one of the most profitable occupations in the reserves.

An increase in the consumption of tembo has accompanied the decline in tribal authority. Formerly forbidden to all but the elders, the drinking of intoxicating liquor has now extended to the young men and the women, and is a social and economic menace.

11. NATIVE AGRICULTURAL SHOWS.

The year under review has seen, for the first time in the history of the Protectorate the organisation of Native Agricultural Shows, which were held in the Malindi, Digo, and Kilifi Districts, with considerable success. The exhibits of produce and livestock were very fair in quality, and provided to the thousands of natives who assembled excellent examples of the possibilities of production. These exhibitions of produce constitute one of the most effective forms of agricultural propaganda, and their continuation and extension are strongly recommended.

12. COMMUNICATIONS.

With transport conditions as they are at the present time, permanent progress and the production of a large exportable surplus of agricultural produce is almost impossible. Lack of good roads has also been partly responsible for the famine conditions in the Digo District during the past year. While maize was three pichies for Shs. 2 in the Digo District it was twelve at Kakoleni in the Sabaki area not eighty miles distant. In one district food was very costly, while in the other the price was very low, and there was no encouragement to increase production.

I consider that among others, (1) the condition of the North Coast Road, (2) the inefficiency and heavy charges of the ferries, and (3) the lack of a main road from Mombasa eastward into the hinterland, to be largely responsible for the present comparatively unproductive state of the Coast Districts.

It is only at such points as Mariakani and Malindi where travelling and transport conditions are reasonably good, that progress is possible.

Applications for land have been numerous, but when transport difficulties are realised, the impossibility of marketing the produce at competitive prices has been appreciated, and capital has been taken elsewhere.

13. CONCLUSION.

It will be seen that the year 1925 cannot be described as a very prosperous one due mainly to unfavourable weather conditions. Nevertheless it is hoped that the coming year will show an improvement in this respect.

Relations with the Officers of the Administration have been excellent, and it is only due to their enthusiastic cooperation that results have been obtained.

In conclusion I should like to express my appreciation of the work of the members of my staff.

A. G. BAILEY,

Senior Agricultural Supervisor.

APPENDIX No. 2.

Seeds issued and Districts where distributed :—

District.	Maize.	Simsim.	Ground nuts.	Rice.	Cotton.	Beans.	Onions.
	bags.	bags.	bags.	bags.	bags.	bags.	lbs.
Malindi ...	6	22	70	...	120	1	2
Digo ...	16	22	24	30	39	2	...
Kilifi ...	6	45	...	15	51	...	...
Mombasa ...	2	1	1	...	3	$\frac{1}{2}$	...

Comparative Statement of Agricultural Exports from Kilifi and Takaungu for year 1924-25.

Commodity.	Quantities.		Values.		1925.	
	1924.	1925.	1924.	1925.	Increase.	Decrease.
			Shs.	Shs.	Shs.	Shs.
Maize	...	...	...	...	...	116,940
Rice (paddy)	...	...	...	...	...	2,549
Other grains (beans)	...	...	...	...	...	 12
Fruits, fresh	...	...	...	...	...	
Ghee	...	...	...	...	...	
Tobacco, unmanufactured	...	...	...	...	...	1,005
Sisal	...	...	...	...	...	
Simsim	...	...	...	...	...	15,566
Copra	...	...	...	...	...	3,775
Coconuts	...	...	...	...	...	67
Coconut Oil	...	...	...	...	...	85
Hides	...	...	...	...	...	
Skins	...	...	...	...	...	
Rubber	...	...	...	...	...	
Honey	...	...	...	...	...	
Millet	...	...	...	...	...	40
	...	...	...	...	...	5,691

APPENDIX "N"

REPORT.

OF

SENIOR AGRICULTURAL SUPERVISOR, NYANZA PROVINCE.

STAFF:

Mr. Booth left in March to proceed on leave and returned here in December.

Mr. Sheppard left here on April 7th to proceed on leave.

Mr. Spranger left here on November 27th on transfer to Nairobi.

For the best part of the year the staff has consisted of:

- 1 Senior Supervisor.
- 2 Supervisors.
- 10 Native Instructors.
- 12 „ Apprentices.

RAINFALL.

The rains started normally but a period of drought was experienced in April, which threatened to cause a food shortage, especially in those areas adjacent to the Lake shore, and the Native foodstuffs Ordinance was applied to the Province. However, good rains fell afterwards, and there was little shortage. A further drought was experienced in August and September, followed by heavy rains in November and December.

NORTH KAVIRONDO.

Cotton: Buying commenced on 1st January, though unusual rains experienced in the first half of the month did a certain amount of damage. At the beginning of the season the price of seed cotton was -/23 to -/20 cents per lb., but later the price fell a little. Buying posts were established as follows:

British Cotton Growing Association-Malakisi Ginnery.

Tororo Road and Lwakaka.

Allibhai & Rahamtulla-Lusumu, Busia, and Lokolis.

Folkes & Hilton-Nambare Ginnery, Busia, and Lokolis.

Small & Co.-Marach.

Buying did not appear to be too satisfactory at certain posts.

GINNERIES.

Malakisi Ginnery was not completed until the end of April. Nambare Ginnery did not start ginning until the end of May, and no press has yet been installed here. One store only on the Lusumu ginnery site was erected, and the site has now lapsed. The total figures for the season are as follows :

British Cotton Growing Association,			
Malakisi ...	...	...	694,521 lbs. seed cotton.
Folkes & Hilton, Nambare ...	...	...	265,826 lbs. seed cotton.
Small & Co., Samia ...	...	...	506,33 lbs. seed cotton.
Allibhai & Rahamtulla ...	...	...	420,977 lbs. seed cotton.
Total ...	1,431,957 lbs. seed cotton.		

Most of the S. W. Ohayo and part of the Marach cotton went direct to Samia ginnery, and has therefore been included in the Central Kavirondo returns.

1925 CROP :

Little planting took place in May, most of the cotton being sown in June and July. The following seed was issued :

Malakisi ...	...	50 tons.
Nambare ...	...	40 tons.
Marach ...	...	6 tons.

Cotton was not a success in parts of Waholo, Wanga, South Kitosh, and Maramma last year, so planting in this area has not been encouraged, but an increased acreage has been planted in the more favourable localities.

Practically no rain fell in August, September and part of October, and the later sowings received a serious set back, especially round Malakisi, growth being very small. This was followed by heavy rain in November and December, which

has affected the early cotton, and the crop promises to be a small one, and the cotton of moderate quality only. Along the border, however, from Lokolis down to Mwekas conditions are more favourable. Hail has also done a little damage in places. Buying starts on January 4th but little cotton is ready at present.

MAIZE.

An issue of 52 bags of Flat White maize from Bukura farm was made to the N.E. part of North Kitosh early in April, and 25 bags to South Kitosh location. An endeavour was made to see that this was planted away from the native coloured maize. In Maragoli and Bunyori locations a very good crop was harvested, and most of the Maize coming from this area is of the flat white type, while secondary plantings are looking well. Seven water mills for grinding meal have been installed here on the company system by natives, and two more are in course of erection.

SIMSIM.

A very fair crop was harvested early in the year, Mumias and Butere being the chief buying centres. Prices ranged from Shs. 4/- to Shs. 4/50 per frasila. In July 26 bags of seed were distributed from Mumias to Kabras and Kakalelwa locations in the area through which the railway is to run. At the present moment a good crop generally is indicated, and picking is now starting.

GROUNDNUTS.

67 bags of seed were distributed early in April in Wamia, Ohayo, and Marach locations, so that the natives here might start a rotation crop. The seed was planted in the old cotton and wimbi shambas, but did not do well. The soil does not appear too suitable for the crop here, and losses occurred due to broken kernels as only hulled seed was available.

RICE.

One ton of paddy seed was distributed from Mumias to Wanga and South Kitosh locations in December, and planting is now starting. The natives show keenness for the crop which has been grown periodically for many years in this area.

FOOD CROPS.

In the northern area moderate yields only were harvested owing to the drought, though good crops were reaped in the southern area. The short rain crops are

satisfactory, and there should be no shortage of food, though the M'tama crop is only moderate. Grain stores for use in case of famine have been erected in Headman Locolis district, and have been filled with Wimbi.

CENTRAL KAVIRONDO.

COTTON.

Buying commenced in December in Kisumu and Asembo, and in January in the Sio area. Prices ranged from -/20 to -/26 cents per lb. for seed cotton. The rains experienced in January were responsible for a certain amount of stained cotton, and the picking and grading is still open to improvement. Several lakhs of cotton from over the border went to Sio ginnery. Buying posts were established as follows:—Small & Co—Sio ginnery, Sio, Ugenya, Luambwa, and Kadimo. B.E.A. Corporation,—Kisumu ginnery, Old Kisumu, and Sio.

British Cotton Growing Association—Asembo ginnery, and Old Kisumu.

The new ginnery at Kibos (Hasham Jamal) was completed and started working in March.

The uprooting and burning of the old cotton was efficiently carried out, and little disease has been observed.

Returns of seed cotton purchased are as follows:—

Small and Co., Samia	...	...	889,175 lbs.
B. E. A. Corporation, Kisumu	...	...	223,311 lbs.
Hasham Jamal, Kibos	...	...	129,593 lbs.
British Cotton Growing Association, Asembo			63,324 lbs.
Total			... 1,305,403 lbs.

68,473 lbs. of the 129,593 lbs. bought by Hasham Jamal at Kibos came from Indian growers.

1925 CROP.

In the Asembo area earlier planting was tried, and 15 tons of seed was distributed in February and March. Owing to the drought in April, this seed was only planted in May, and as little rain fell afterwards, the crop was a poor one, especially in Uyoma. Buying started in October, and up to the end of the year some 40,000 lbs. have come in, which practically represents the total crop here. Prices started at 0/24 cents but soon fell to 0/16. In Uyoma the native is already preparing shambas for planting next year.

In the Kisumu area 5 tons of seed only was issued. The natives here show very little interest in the crop, practically no cotton being planted in Kano. Nearly 30,000 lbs. has come in to date, and little more remains to be picked. Hasham Jamal and Co. only are buying here this season.

In the Sio area 68 tons of seed was distributed, and a much bigger area was planted up this year. A lot of the seed however was broadcasted, and much supervision was necessary to see that shambas were thinned out. Owing to lack of rain in August and September, a number of the July plantings failed, especially in Unyala, and growth was poor. Heavy rains however fell in November, and the crop is now more promising, though some of the early cotton has suffered. Buying started towards the end of December and a lakh has come in to date, though part of this cotton came from across the border. Price 0/18 and 0/16 cents. The low market price this season has caused dissatisfaction, the natives refusing to sell until barazas had been held explaining the position, and a number state that they will not plant again at the present prices.

MAIZE.

200 bags of Flat white maize was issued in the higher country round Kisumu, Sagam, Seme, and South Gem locations with a view to eradicating the native coloured type, and a good crop has been obtained from this area, and from North Gem, whilst secondary plantings promise well. The market was low, under Shs. 3/- per maund being obtained in Kisumu. The low price is partly due to fear on the buyers' part that the maize may be damp, and more educated buyers in the reserve would be of assistance. Maize is growing in favour, and is slowly replacing M'tama as the main food crop of the native in the higher areas.

Natives here and in the Maragoli area have bought over 100 Colonist mills during the year.

GROUNDNUTS.

40 bags of seed was issued to Asembo, Uyoma, Sakwa and Seme locations, and a fair crop was reaped. Prices at Asembo about Shs. 4/25 per frasila.

SIMSIM AND CHIROKO.

Fair harvests were reaped in the early months of the year, and these crops are popular. Prices ranged about Shs. 5/- for the former, and Shs. 3/50 to 4/- for the latter. At the present moment excellent harvests are promised, and picking will start in January.

FOODCROPS.

Good harvests were generally obtained, though the Mtama crop in Kano was a partial failure owing to the drought, and similarly small crops only were obtained in Kadimo and Sakwa. The short rain crops promise well.

PLOUGHS.

About 40 ploughs and a few cultivators and harrows were bought by more intelligent natives and chiefs, who are slowly beginning to realise the amount of labour which is saved by the use of these implements.

TOTAL PRODUCTION OF COTTON IN THE PROVINCE.

2,778,957 lbs. seed cotton was purchased in the 1924/25 season. This is approximately equivalent to 2,083 bales.

The average yield of cotton per acre is a low one and could easily be doubled with proper cultivation, the majority of growers being content to scratch the ground over once only before planting. Now that prices are tending to become stabilised again after the war, better cultivation rather than increased acreages is what is required to make the crop a profitable one.

SOUTH KAVIRONDO.

COTTON.

Buying commenced early in December, prices being from -/20 to -/25 cents per lb. Buying posts were established as follows :—

Hasham Jamal and Co.—Kendu Bay Homa Bay and Karungu Bay.

B. E. A. Corporation—Kendu Bay.

Small and Co.—Karungu Bay.

Total cotton bought was 40,886 lbs.

Most of this cotton came from the coastal locations, and from the Karungu area in particular.

The uprooting of the old cotton plants was at first much neglected, and the natives had to be informed of the necessity for doing this.

1925 CROP.

This season it was considered advisable to plant with the big rains, and the following seed was despatched in March.

Kendu Bay	...	4 tons
Homa Bay	...	4 tons
Karungu Bay	...	4 tons

Cotton was mainly confined to the coastal area, but owing to the drought and the indifference for the crop shown by the natives, and especially the elders, planting did not start until June. Not more than 300 acres have been planted, barely 3 tons of seed being taken up. Much of this acreage has been destroyed by drought, and about 10,000 lbs. of seed cotton only is to be expected. There is undoubtedly a large potential cotton area along the lake shore here, but it is unfortunate that the native is so averse to the crop.

WHEAT.

This crop is grown in the highland locations, and 2,000 lbs. of seed was issued to selected natives. Planting took place in May and June, and a very fair crop has been reaped. A little rust appeared, but not to any extent. Better harvesting methods were observed, but many natives were slow to market their grain, and buyers had frequently to go into the reserve to buy and take away the grain. Prices were Shs. 6/- per frasila in Kisii, and Shs. 4/- per frasila in the reserve.

GROUNDNUTS.

This is a well established crop in the Central and Coast locations, but the season has not been a good one, 439 tons being exported from the district this year, as against 633 tons in 1924. Prices were about Shs. 4/- per frasila. 500 lbs of seed was distributed to the border locations, where the crop is a new one, but the results were rather disappointing.

SIMSIM & CHIROKO.

Good crops were reaped early in the year, and the present crops promise well. Prices for Simsim were about Shs. 4/- per frasila. 1433 tons were exported this year as against 1282 tons in 1924.

BUCKWHEAT.

This has been tried in the highland and central areas for the first time with success. Unfortunately the seed was not planted in the shore area, where it should prove most suitable, owing to lack of rain at the time of issue.

FOODCROPS.

Normal crops of mtama and wimbi were reaped, except in the coastal locations, which suffered badly from lack of rain, and a food shortage has been felt here.

TSETSE FLY.

Two miles of land along the banks of the Miriu River in Karachnoya have been reclaimed from bush by the Medical Department, as owing to fly here the land has been abandoned in the past. The land has been divided up among the natives, and has been put under cultivation, seven acres being planted with cotton.

GHEE INDUSTRY.

A dairy has been erected in Kisii and started in October. The natives are keen, and the quantity of milk brought in is on the increase, about 15 gallons per day coming in at present. The quality of the ghee is good, and the native receives 0/63 cents per gallon of milk supplied.

BUKURA EXPERIMENTAL AND TRAINING FARM.

STAFF: The following were employed :

Carpenter	...	1
Native Instructors		3
Bricklayers	...	5
Labourers	...	50-55.

WEATHER.

The rainfall for the year was 53.05 inches, 5.41 inches more than for the previous year. During the last three months 14.73 inches fell, which seriously interfered with the harvesting of crops.

HEALTH.

With the exception of dead plague rats being found on the farm in August, there has been little sickness. The farm has been periodically visited by the local Medical Officer.

BUILDINGS.

The following have been erected-posho mill, engine house, maize crib, five apprentices huts, two instructors huts, three instructors kitchens, one apprentices kitchen, two lavatories,

two guest houses, and one kitchen and pantry. The posho mill and engine house consist of a building 50 ft. by 28 ft with an iron roof, in which is housed the disintegrator and steam engine. The capacity of the mill is 9 cwts. of meal per hour. The maize crib is joined onto the posho mill, and consists of two compartments, each capable of holding 500 bags. Each hut consists of a 20 ft. by 10 ft. brick building with a thatched grass roof. The first guest house is a brick building 33 ft. by 15 ft. with a thatched roof. It consists of two rooms and a front verandah. The second house is similar, but it is 3 ft. longer.

Field Crops,		Acreage.	Planted	Harvested	Yield.
Maize Hickory King	...	5	12.3.25	18.9.25	60 bags
Maize, Flat White	...	23	4.4.25	16.12.25	350 "
" " "	...	13	28.4.25	23.11.25	100 "
" " "	...	8½	26.5.25	28.12.25	60 "
" " "	...	8	7.6.25	28.12.25	30 "
Total	...	58½	...	...	600 bags

Demonstration Plots.

Plot No.	Crop.	Acreage.	Date of Planting.	Distance	Date of Harvesting.	Yield per acre.
1	Gram	2/3	31-3-25	3' x 1'	25-7-25	45 lbs.
1a	Chillies	1/3	31-3-25	4' x 2'	26-7-25	783 lbs.
2	Wimbi	1	1-4-25	drills	18-8-25	1044 lbs.
3	Groundnuts	1	2-4-25	2' x 2'	6-12-25	600 lbs.
4	Buckwheat	1	4-4-25	drills	17-6-25	2500 lbs.
5	Beans, C.W.	1	4-4-25	3' x 18"	21-8-25	300 lbs.
6	Mtama	1	4-4-25	3' x 18"	15-10-25	Failure.
7	Maize Hickory King	1	4-4-25	3' x 18"	20-7-25	1400 lbs.
8	Wheat	1/3	15-5-25	broadcast	6-10-25	513 lbs.
9a	Linseed	2/3	15-5-25	broadcast	20-8-25	392 lbs.
9	Maize Flat white	1	8-5-25	3' x 18"	6-10-25	1200 lbs.
10	Cotton	1	25-5-25	3' x 2'	Not yet harvested	.....
11	Pigeon pea	1	20-6-25	3' x 3'	do.	.....
12	Cotton	1	18-6-25	3' x 2'	do.	.....
13	Groundnuts	1	18-6-25	3' x 2'	do.	400 lbs.
14	Sweet Potatoes	1	22-6-25	3' x 1'	Not yet harvested	.....
15	Cotton	1	31-7-25	3' x 2'	do.	.....
16	Cotton	2/3	8-5-25	3' x 2'	do.	.....
...	Mtama	2/3	8-5-25	3' x 18"	Failure	.....
...	Wimbi	1/3	8-5-25	drills	do.	.....
...	Groundnuts	1/3	8-5-25	2' x 2'	24-12-25	300 lbs.
17	Maize	2/3	8-5-25	3' x 18"	12-11-25	1800 lbs.
...	Mtama	1/3	8-5-25	3' x 18"	Failure	.....
...	Wimbi	1/3	8-5-25	drills	do.	.....
...	Groundnuts	2/3	8-5-25	2' x 2'	24-12-25	300 lbs.

NURSERY.

Owing to the very heavy rains that fell in July most of the seed beds were washed away. The following seedlings were raised and have now been planted out: Eucalyptus Citriodora, Globulus, and Saligna Paw-paw, lemon, orange, kapok, tree tomato, mulberry, and pineapple.

STOCK.

Oxen on hand at 1.1.25	...	31
Oxen purchased in October	...	13
Oxen on hand at 31.12.25	...	35

8 oxen have died from old age-these were all condemned by the Veterinary Officer-and one ox from double inoculation. During the year 40 young oxen from natives were sent in for training. Owing, however, to an outbreak of rinderpest all the susceptible oxen were double inoculated, and 8 of these died. The remaining 32 are fully trained, and are now to be returned to their owners, most of whom have though ploughs.

SCHOOL.

There were 41 pupils in the school at the beginning of the year, but later 9 boys were discharged as being unsuitable. The greater portion of their time has been devoted to general farm operations, though they have received $2\frac{1}{2}$ hours class room work per day. Though of a somewhat slow nature the progress recorded since the establishment of the school has been considerable. Each pupil has a school garden $\frac{1}{20}$ th. of an acre in extent, and the gardens generally reflect credit on the owners. The school was closed for a month's vacation in July and again in December.

The following figures show the amount of the chief agricultural products which passed through the Customs, Kisumu, from the Gulf Ports of Nyanza Province for the year :—

[illegible]

The following figures show the amounts of the chief agricultural products grown in Nyanza Province which have passed through Kisumu during the year :

			Station	Pier.	Total.
			Tons.	Tons.	Tons.
Maize	...	...	11,180	85	11,265
Groundnuts	...	...	47	90	137
Simsim	...	...	1,496	580	2,076
Beans	...	...	31	1	32
Rice	...	...	61	...	61
Wheat	...	...	4	...	4
Other grains...	...	...	704	...	704
Maize flour	...	...	62	...	62
Wheat flour	...	...	8	...	8
Vegetables	...	...	40	...	40
Hides	...	...	676	21	697
Skins	...	...	87	...	87

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